FOOD MANUFACTURE

reporting Food Industries Weekly

ONARD HILL LIMITED, 17, STRATFORD PLACE, LONDON, W.1 OCTOBER 1, 1942

Fit

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AND SAVE ELECTRICITY!

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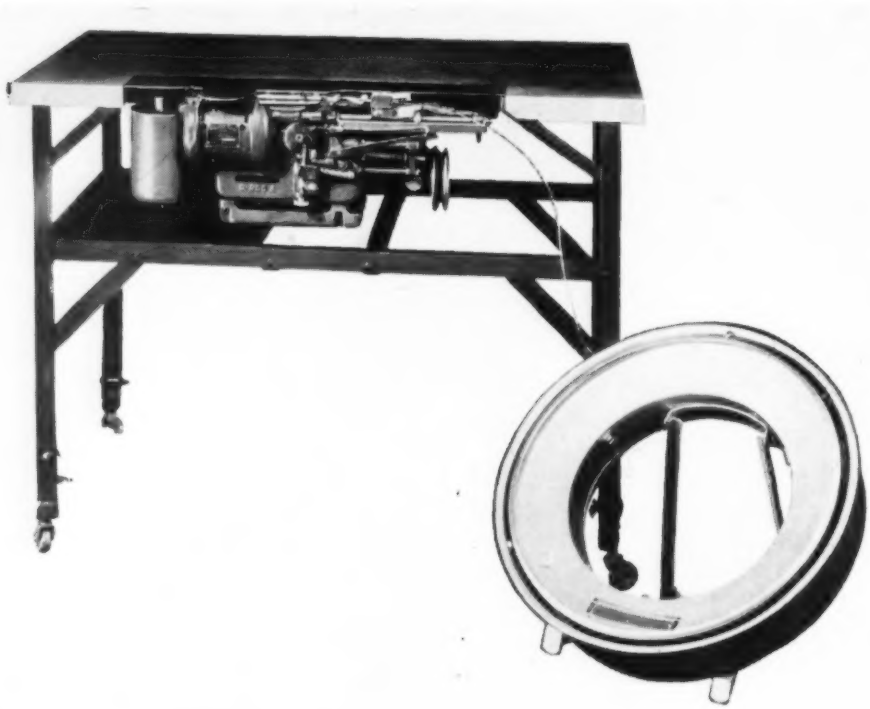

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— FOR — "Service to Science"

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I think that some of the information we have accumulated during the last year's intensive work on thermostatic problems may be of real use, and should be passed on as part of our "Service to Science policy."

Townson has now developed new Baths and Regulators which give quite remarkable performances, and which we will detail more fully later. We feel, however, that the following figures, obtained in my laboratory a week or so ago, are particularly interesting. They show the improvement possible in performance by substituting our latest equipment in a normal Bath. R.B.B.

CIRCULATED BATH, 4 GALLON CAPACITY. BECKMAN THERMOMETER. 30·0° C. ROOM 16° C.

A	B	C	D
Standard Heater Standard Relay	*New Heater Standard Relay*	*New Heater New Relay*	*Special Heater Special Relay Special Stirring Special Regulator*
3·26	3·28	3·25	
3·36	3·26	3·27	
3·20	3·30	3·26	
3·17	3·25	3·26	
3·37	3·28	3·27	*No perceptible movement on Beckman*
3·17	3·25	3·25	
3·40	3·30	3·26	
3·23			

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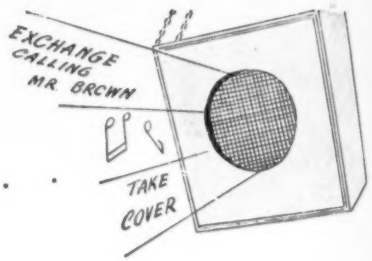

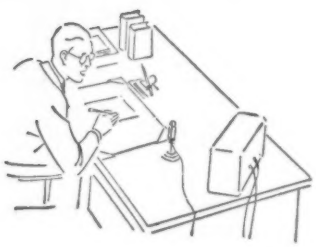

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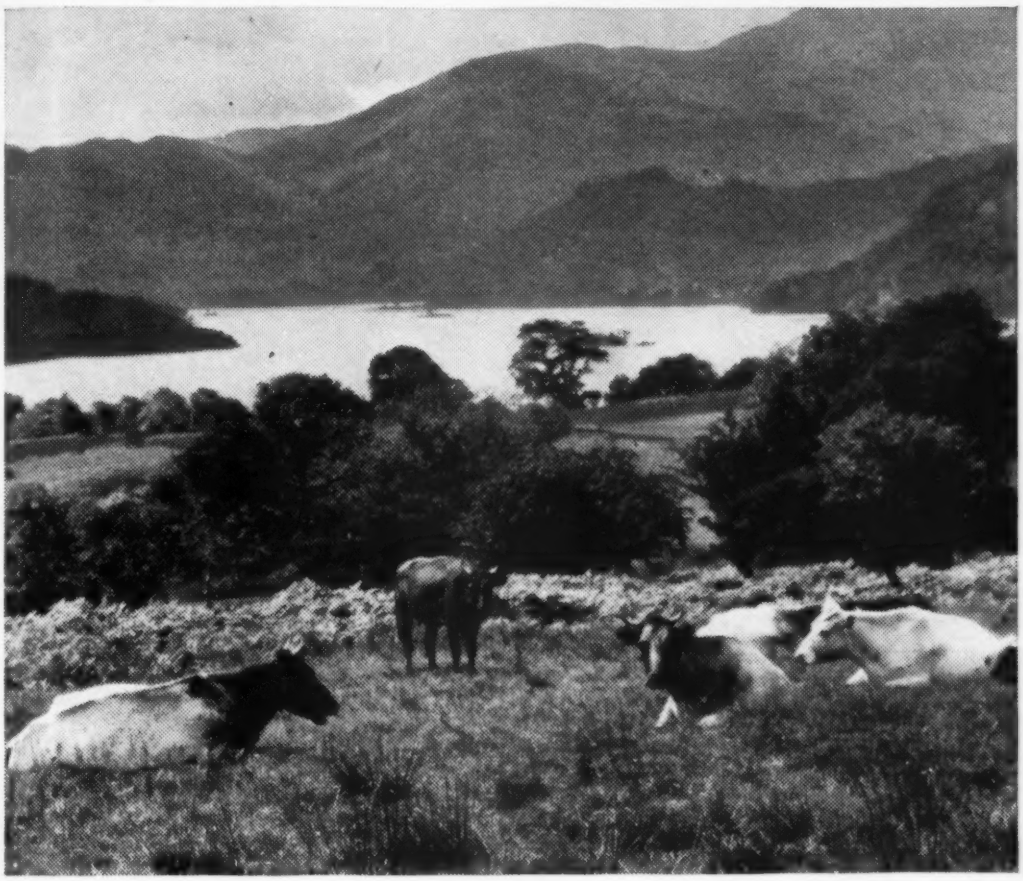

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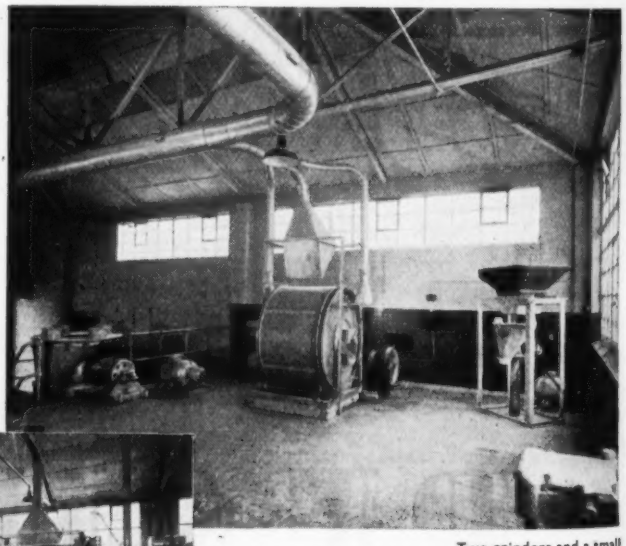

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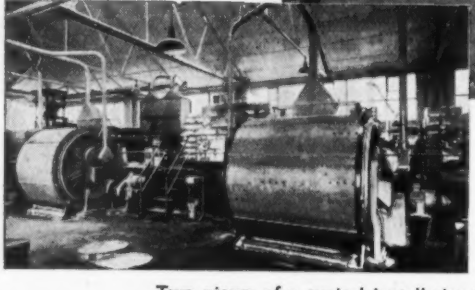

Two blenders 1-ton and 1½ tons capacity, driven by 5 h.p. (450 r.p.m.) and 6 h.p. (970 r.p.m.) slip-ring motors respectively.

Two views of a typical installation.

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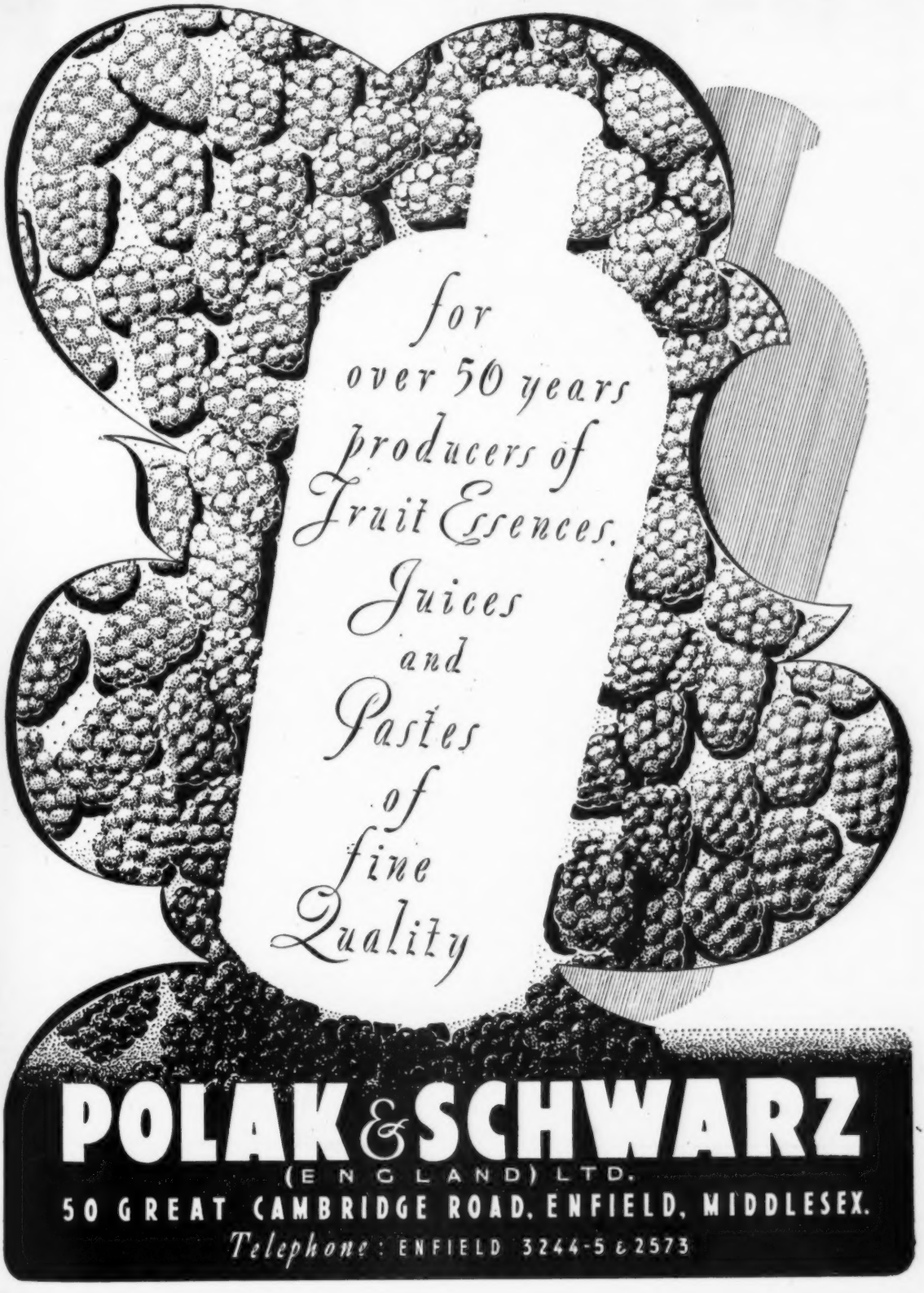
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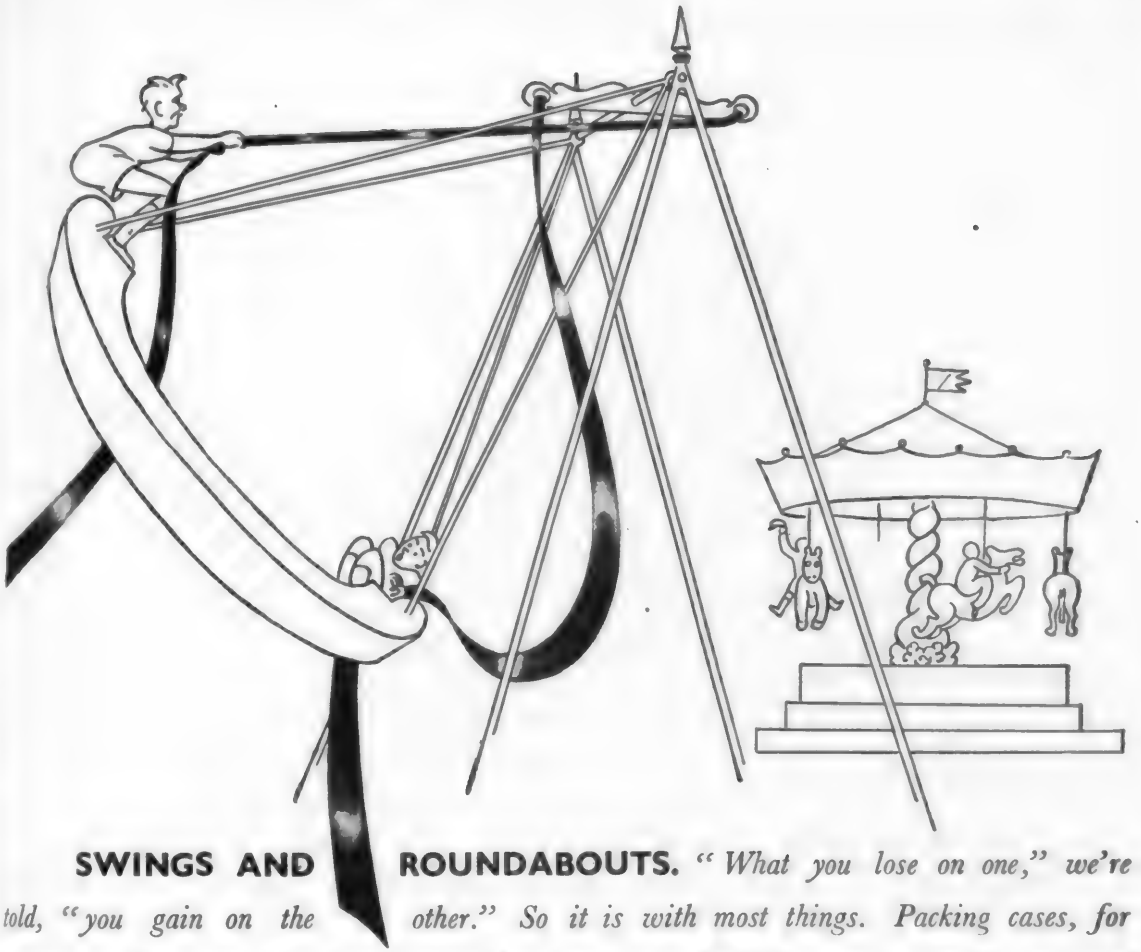

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CEC9

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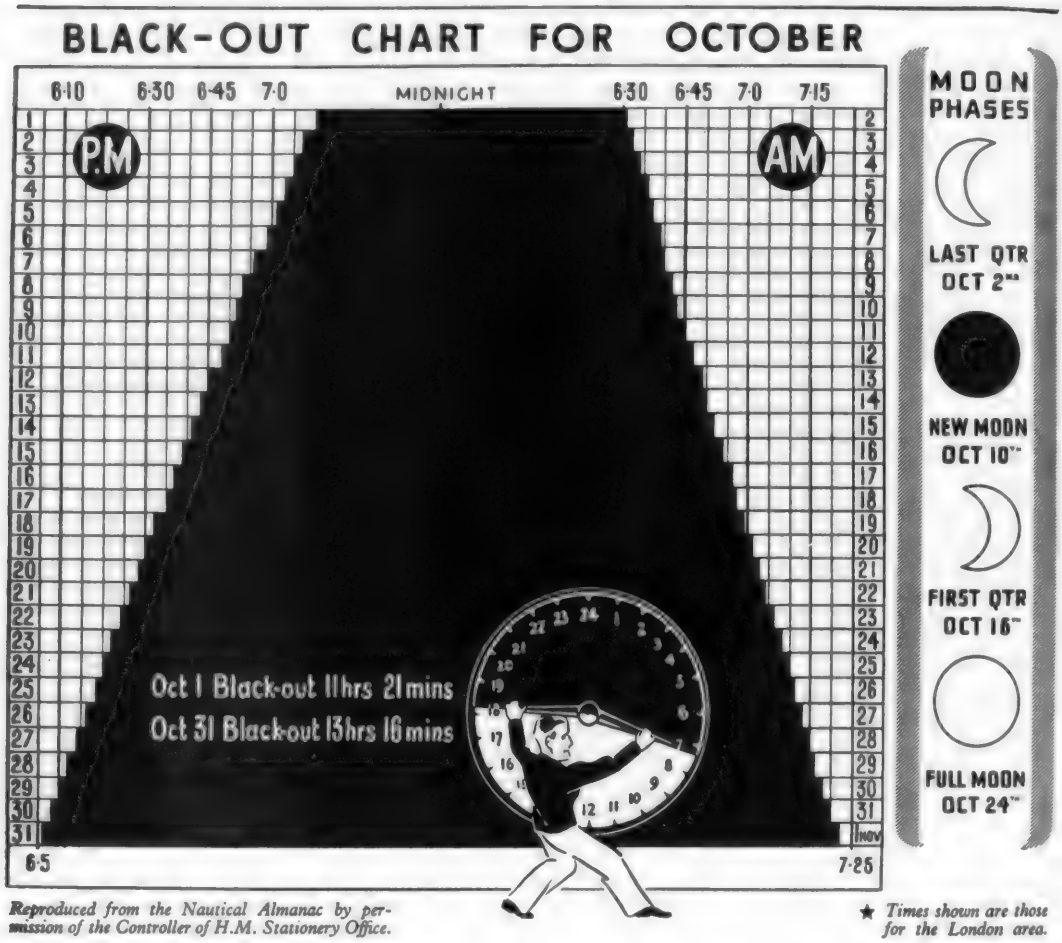

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★ *Times shown are those for the London area.*

Look at the shape of the chart — see how swiftly, relentlessly Autumn increases the hours of darkness. How will they affect working conditions and production? Very little if the lighting is good. Good lighting and Osram lamps have always gone together — a fact borne out in these days of greater and greater output.

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Type 1
J.A.

OUR latest design of Heavy Duty Direct Motor Driven Pulper is of wonderfully robust construction and great capacity. For Pulping tomatoes, oranges, apples, plums, and stone fruits generally, passing or straining soups, sauces, etc., this machine produces magnificent results. Illustration shows the machine with Stainless Steel Body, Stainless Steel renewable Screen and all parts in contact with the product of Stainless Steel.

The drive is from self-contained Electric Motor mounted on the bedplate through Renold Silent Chain enclosed in oil-tight case to the Spiral Gears. All shafts run in specially enclosed Bearings. This machine is also constructed with Fast and Loose Pulleys for Belt Drive.

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Always on the job, dependable, untiring, unfailing in its precision. He can't be called up after being thoroughly trained . . . he is "permanently reserved." He doesn't hold his hand out on pay-day, he keeps it on the valve.

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IN THE INTERESTS OF NATIONAL ECONOMY

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It is very necessary that such metals which must be imported and are becoming increasingly scarce should be conserved.

In most conditions black steel equipment with Lithcote enamel in place of such metals will give equal service.

You will be co-operating actively in the War Effort.

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Through filter's spout
The blossoming flowers
And trees come out.

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Specialists in the removal of foreign matter.
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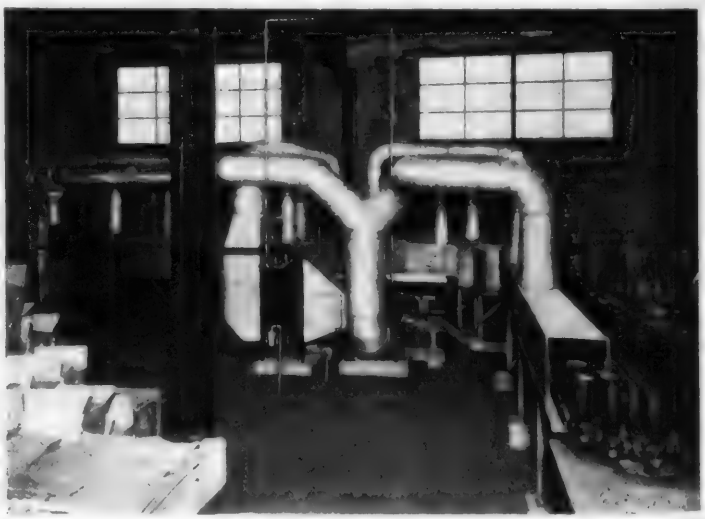

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designed to meet individual requirements

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Showing an Albro 16-head vacuum-operated filler for Worcester Sauce; constructed throughout in bright polished Stainless Steel.

Output 400 doz. per hour.

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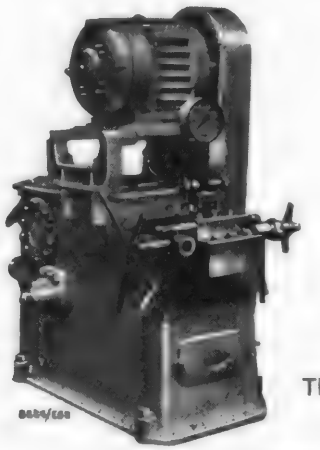
HOMOGENISATION Improves Food Products



The use of substitutes in processed food is unavoidable to-day. The problem of the manufacturer is to maintain the "Appeal to the Palate" and improve the keeping quality. You can do this with

BRUSH

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Write for Publication F.M.E. 66

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5-38

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From "AN ALLARME TO ENGLAND" . . . written in 1578
"Would to God so many precedents of others' mishaps might make England take heed. Remember the longer it hath been calm the sooner the storm is looked for, and the greater the rage when it falleth."
ENGINEERS • EXPERT WORKERS IN MILD STEEL • GALVANIZERS • FABRICATORS OF INDUSTRIAL PLANT, TANKS, VATS, VESSELS •
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for the safe transport in bulk of liquid foods, glucose, fruit juices, etc.

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MINISTRY OF WORKS & PLANNING

COMPULSORY DISCLOSURE OF SCRAP METAL

(*Defence (General) Regulations*, 1939, *No.* 56 AAA, *S.R. & Os.* 1942, *Nos.* 761 *and* 1723.)

THE OCCUPIER OF EVERY PREMISES in Great Britain must furnish to the Ministry of Works and Planning a return of any accumulation on those premises of 3 tons or more of metal suitable for scrap.

Returns must be made on the prescribed form *within* 30 *days of the* 21*st September*, 1942, or of any subsequent day on which such an amount of metal suitable for scrap is brought on to the premises.

Metal is deemed suitable for scrap if it is, or forms part of, any building, structure, machinery, plant or article which is dis-used, obsolete or redundant, or otherwise serving no immediate purpose.

The metal to which the Order relates is *any metal* other than aluminium and magnesium and alloys of either of them.

Under the Order "Premises" means any building or land having an assessment under Schedule 'A' or subject to a valuation for rating.

Failure to make the required return renders a person liable to the penalties prescribed by Defence Regulation 92 (fine, imprisonment, or both).

YOUR RETURNS MUST BE FORWARDED BY 21st OCT.

In the case of empty premises the person entitled to occupy those premises has to make the return.

Returns are NOT required where:—

(*i*) A return has already been made from premises in those areas specified in the Scrap Metal (No. 1) Order, S. R. & O. 1942, No. 761.

(*ii*) The Board of Trade or the Ministry of Food certify that the metal is, or forms part of, machinery or plant which is disused or spare in consequence of a concentration scheme approved by either of them.

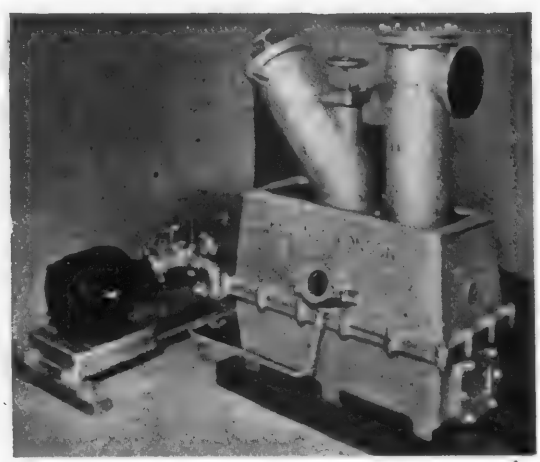
(*iii*) The metal forms part of: a machine tool of any of the descriptions specified in the first schedule to the Control of Machine Tools (No. 9) Order, 1941, or a cutting tool of any of the descriptions specified in the first schedule to the Control of Machine Tools (Cutting Tools) (No. 1) Order, 1942, or any order replacing or amending them.

(*iv*) Returns in respect of the metal are already made to the Iron & Steel Control under the Industry (Records and Information) No. 1 Order, 1940, or No. 2 Order, 1941.

(*v*) The metal forms part of stand-by plant or equipment held by Public Utility Undertakings and is essential for the performance of the statutory obligations of those undertakings, or which is held by them for the purposes of Sections 40, 42, 59 or 60 of the Civil Defence Act, 1939.

★ **FORMS on which returns must be made are obtainable from the Director of Demolition and Recovery (Scrap Metal Order), Sanctuary Buildings, Great Smith Street, London, S.W.1.**

DO YOU USE SO_2 AS A Food Preservative ?



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You can have Sulphur Di-oxide always "on tap" with Kestner Sulphur Burners.

No installation too large or too small.

For continuous operation we recommend our Prentice Patent type.

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What tales he could tell about coal.

And to think that he should live to see the need for a Waste of Fuel Order!

Every user of fuel will need to know just where he stands with the requirements of this Order ; there are so many ways in which fuel wastage can go on unnoticed (except by the expert), especially in steam plant.

Fuel wastage through faulty steam trapping ; through wasted condensate ; through air-diluted steam ; the jobs where steam consumption is higher than it ought to be for the work done. These are only a few of the things that should be looked for and put right.

May we help you to find them and to put them right? We will gladly arrange for one of our Regional Engineers to make a thorough examination of your steam-using plant and to submit a report which will help you to root out sources of fuel wastage. There is no charge for this service.

Please make use of the enquiry slip at the right.

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FOR YOUR NAME AND ADDRESS

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ALL OF THEM PURE MATERIALS—EASY TO MIX—INEXPENSIVE TO USE

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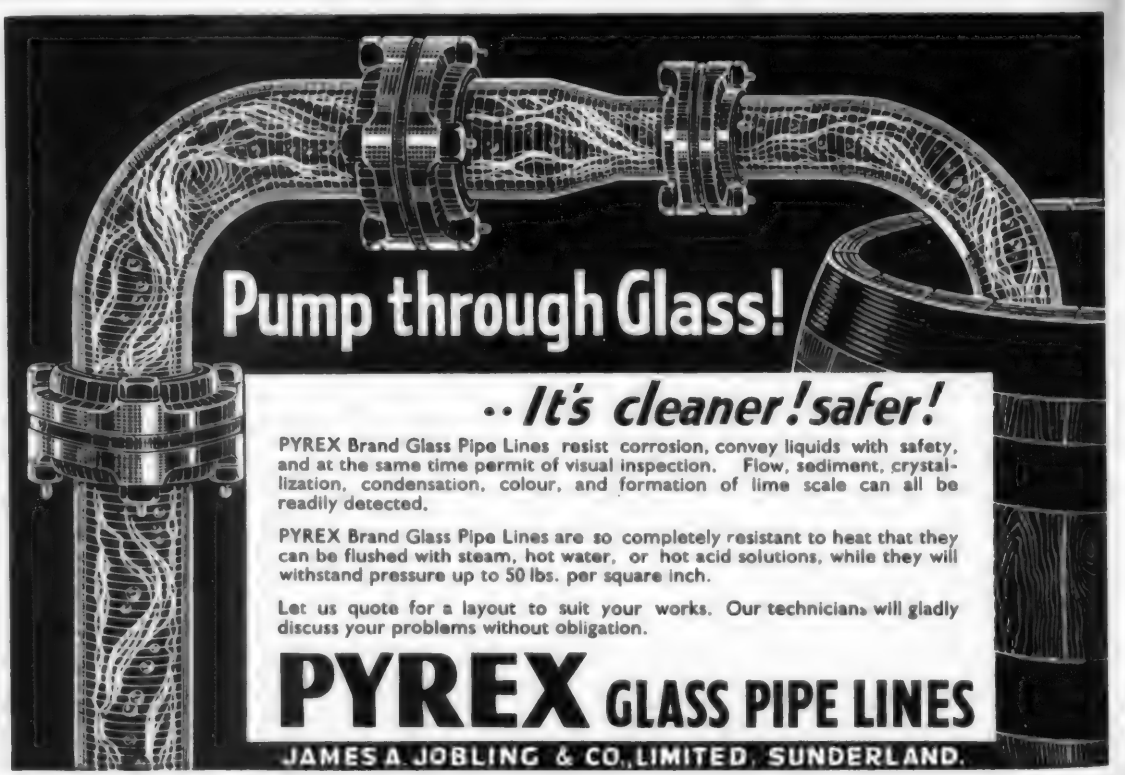
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PYREX Brand Glass Pipe Lines resist corrosion, convey liquids with safety, and at the same time permit of visual inspection. Flow, sediment, crystallization, condensation, colour, and formation of lime scale can all be readily detected.
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Let us quote for a layout to suit your works. Our technicians will gladly discuss your problems without obligation.
PYREX GLASS PIPE LINES
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Whenever you need to concentrate it is easier if you are comfortable, particularly if you can see in comfort. In order that your workers can achieve their best results they need to see in comfort, which means they must have good and suitably planned lighting. Benjamin Lighting is planned to provide the best seeing conditions for every worker; a Benjamin lighting scheme can be prepared for your works, giving you very real help towards maximum production.

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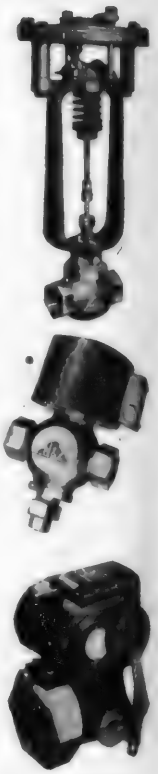
We make controllers to suit your process . . . controllers of sound design, sensitive and precise in action, yet robust in construction. Easy to instal and guaranteed for two years.



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PURDY "WORLD" LABELLERS for bottles, jars, tins, cartons and other packages. Automatic and hand-fed models, placing up to three labels simultaneously on round, flat, recessed or irregular surfaces. Centre gumming. All-round labelling. Top-strapping or sealing. Automatic dating and counting attachments.

PURDY "NEW WAY" LABELLER for round cans. A high-speed, super-adjustable machine delivering up to 200 cans per minute. Positive change in about two minutes, without tools, to any size between 2 × 2 and 4¼ × 5 on model "M-H." Other models take larger or smaller sizes. Special Model "P-G" takes cans fitted for handles.

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One has to be something of a magician these days to meet all the varying demands on an organisation already hard pressed by the requirements of the national effort.

Still, though we cannot produce Glucose out of the proverbial "top-hat," we are doing all in our power to retain the good-will built up over many years by persistent research, efficient manufacturing technique and good service.

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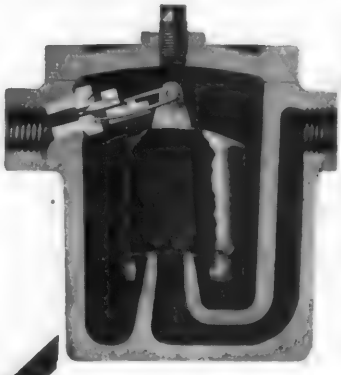

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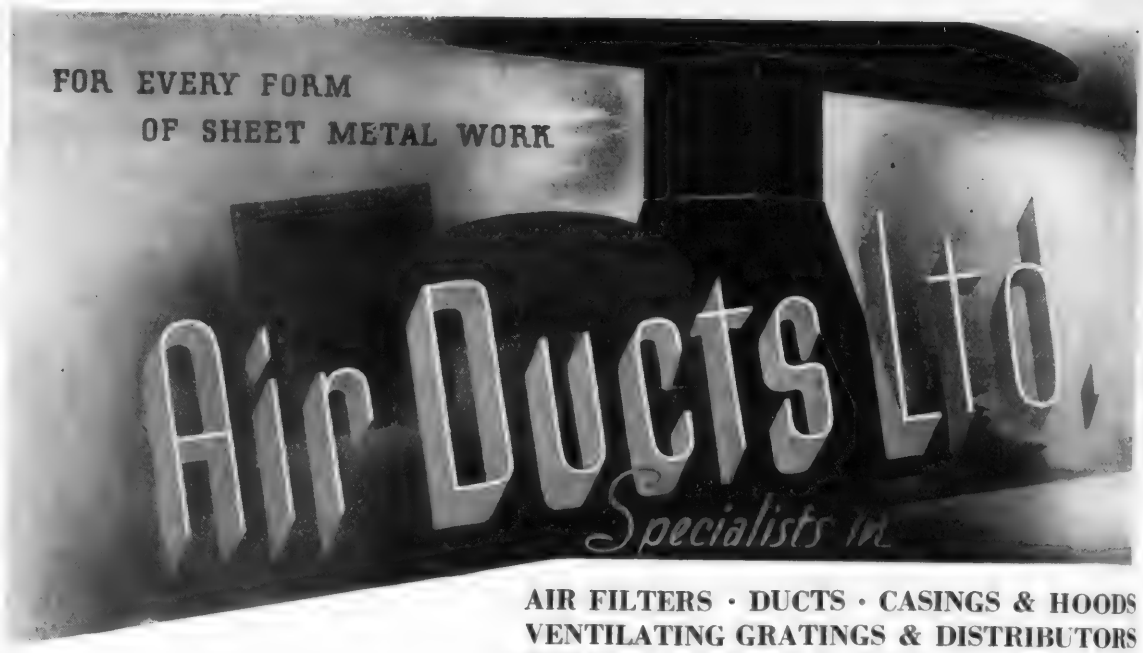

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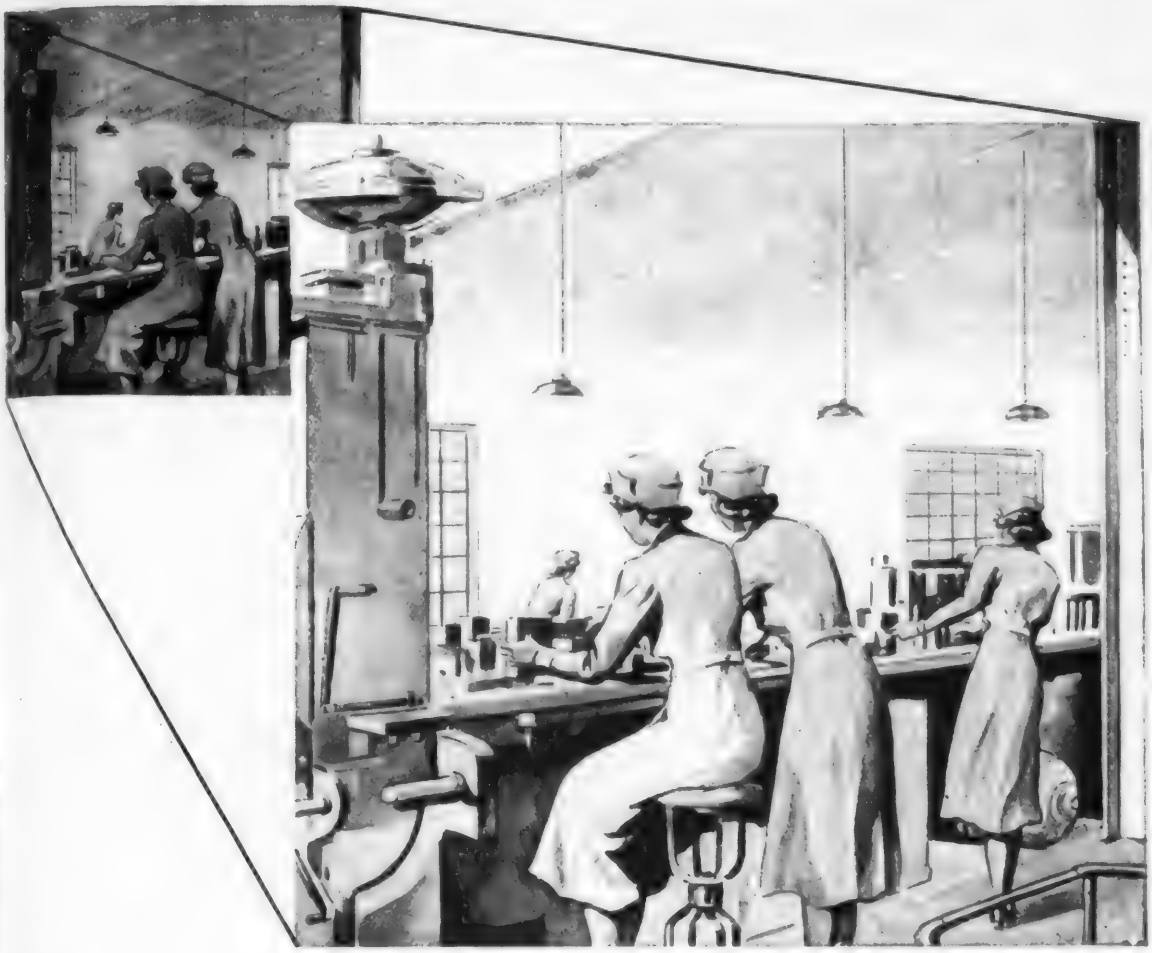

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LIGHT IS ENERGISING. In the brightest days we are fittest. How important it is, therefore, that in these strenuous times, when the nation's need calls for the greatest effort, the interior of workroom and factory should be kept bright and radiant —as all walls of brick, stone and kindred materials are when painted with 'Snowcem'. Moreover, 'Snowcem' is damp-proof, it is hard and durable and does not flake. Also 'Snowcem' is hygienic because it can be cleaned by brushing or washing without staining or suffering other damage—an inestimable advantage in all premises where foods are manufactured or stored. It is supplied in white and broken white, to ensure maximum light reflection.

'Snowcem' has an indefinite life and is officially approved for use under the Factories Act, 1937, Section 1 (c) 1.

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Our Superfine SOYA FLOUR for Bread

1. Improves the sheen on the crumb and bleaches the colour.
2. Mellows the dough — making it easier to mould.
3. Gives a moister and more velvety crumb.
4. Improves the keeping qualities of the bread.

You Just try it and See!

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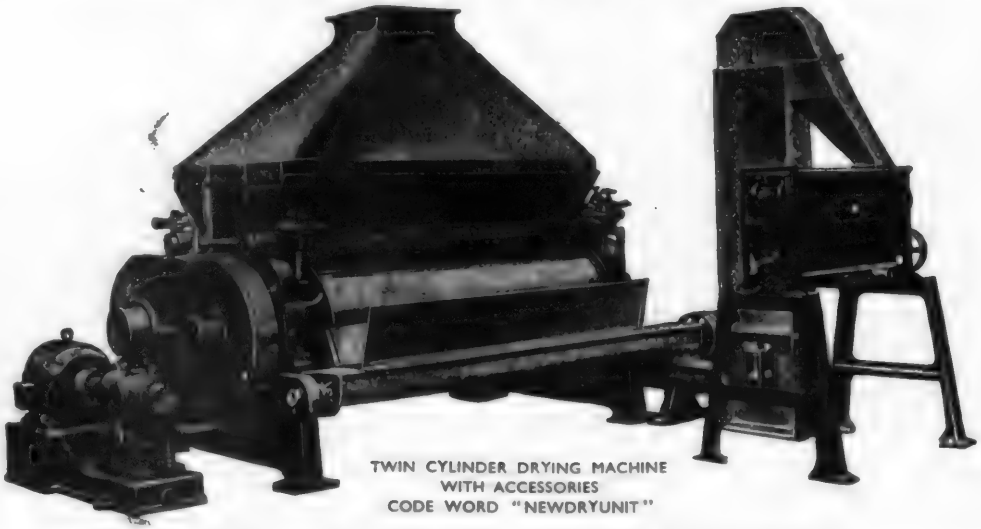
FOR MILK AND OTHER FOOD PRODUCTS



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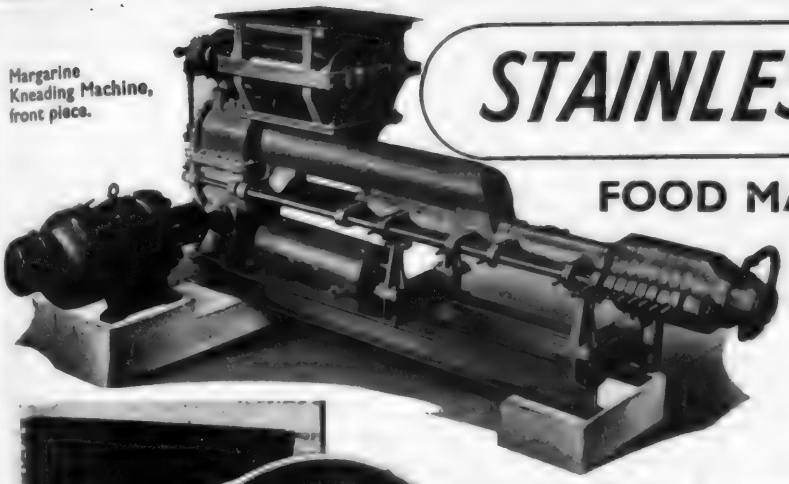
STAINLESS STEEL

FOOD MANUFACTURING EQUIPMENT



Margarine Kneading Machine, front piece.

The various types of Food Plant Equipment illustrated are but a few of the things we are making to help not only Food Manufacturers but also the NATIONAL EFFORT.

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Modern Equipment requiring less operatives and releasing skilled maintenance workers for other types of Tanks—should be the order of the day.

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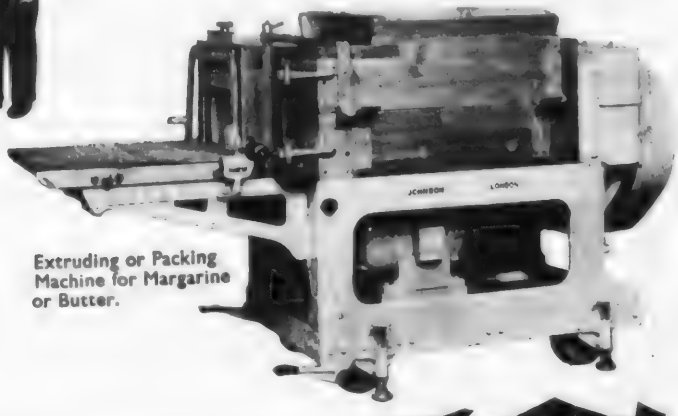
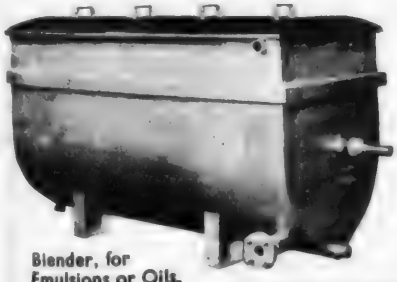
Our technical staff can solve YOUR problems as they have done other special ones connected with more serious matters—which you wouldn't want to know, or if you did—we couldn't tell you.

Storage Tank, nearing completion.



Extruding or Packing Machine for Margarine or Butter.



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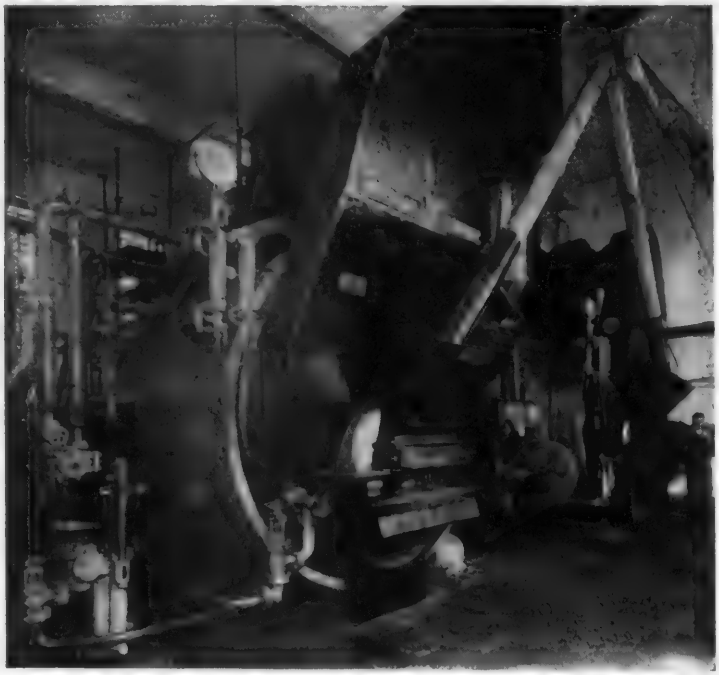

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STEADY SELLING LINES that bring PRESTIGE and PROFIT

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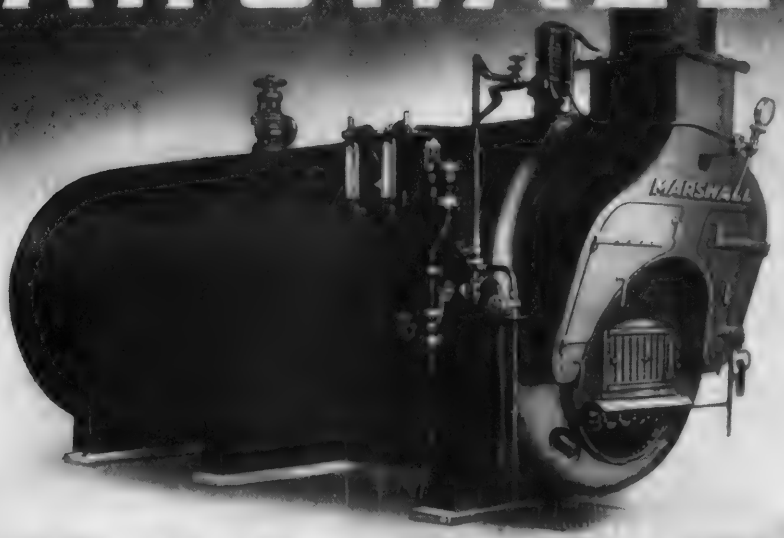

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MINISTRY OF SUPPLY

Defence (General) Regulations 1939
No. 55. S.R. & O 1942. No. 1770

AN ORDER

RUBBER MUST NOT BE DESTROYED THROWN AWAY OR MIXED WITH REFUSE

The Minister of Supply in exercise of the powers conferred on him by Regulation 55 of the Defence (General) Regulations 1939, has made an Order which provides as follows :—

1 No person shall, except under the authority of and in accordance with a licence granted or a special or general direction issued by the Minister of Supply,

(a) destroy any waste rubber
(b) throw away or abandon any waste rubber
(c) put any waste rubber in a refuse bin or other receptacle used for domestic or trade refuse, or
(d) cause or permit any waste rubber awaiting or in the course of collection or sale to be or become mixed with any material or article other than waste rubber.

Provided that nothing in this Order shall prohibit or restrict the destruction of any waste rubber if and so far as necessary in the course of any process of manufacture, or for the purpose of saving property from immediate danger of destruction or damage by fire.

2 (1) The holder of any licence granted under this Order shall comply with any conditions contained or incorporated in the licence.

(2) If any licence so granted is revoked by the Minister of Supply, the holder of the licence shall forthwith deliver up the licence to the Minister or as directed by him

3 IN THIS ORDER:

"*rubber*" includes reclaimed rubber, liquid latex, gutta percha and balata, and "*waste rubber*" means any worn-out, disused, discarded or waste material or article of the classes or descriptions specified in the Schedule to this Order, but does not include any material or article which is injurious to health or otherwise offensive.

4 This Order shall come into force on the 7th day of September, 1942, and may be cited as the Salvage of Waste Materials (No. 4) Order 1942.

THE SCHEDULE

(a) *Articles or materials of any of the following descriptions made wholly or partly of rubber :—*

Balloons • Balls — sports and toy • Bathing-caps • Beds — inflated and sponge • Bulbs — horn, surgical, etc. • Carpet underlay • Catapult strip • Corks and Closures • Corsets — all rubber • Crepe-soled Footwear • Cushions — inflated and sponge • Door-stops • Draught-excluders • Ear Plugs • Elastic Cord and Thread • Electric Cable and Wiring • Football Bladders • Footwear (including Wellingtons and Gum Boots) • Flooring and Tiling • Gloves • Goloshes • Grips — handlebars, etc. • Horse-shoes and pads • Hose and Tubing • Hot-water bottles • Jar-rings • Mats and Matting • Mattresses — inflated and sponge • Milking Rubbers • Pedal-rubbers • Radiator Hose • Rollers • Soles and Heels • Sponge-backed Flooring • Sponges • Squeegees • Stair-treads and nosings • Stopperings • Teapot Spouts • Teats and Soothers • Tobacco Pouches • Tubing • Tyres — Pneumatic (Covers, Tubes and Flaps), Solid and Cushion of all types • Upholstery.

(b) *Articles or materials of any other description made wholly or mainly of rubber.*

THIS ORDER CAME INTO FORCE SEPT. 7

FOOD MANUFACTURE

Vol. XVII. No. 10 · Published Monthly · October, 1942

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FOOD MANUFACTURE

Vol. XVII, No. 10 October 1, 1942

Zoning of Fish

FROM the beginning of this month we may expect cheaper and fresher white fish. It has been one of the strange anomalies of modern times that England, a small island surrounded by excellent fishing waters, should so organise internal transport that stall fish has been sold at exorbitant prices. From the zone system now introduced fresher and cheaper fish should result. In this respect London is privileged, fish being permitted to reach there from any port. The cockney's fish and chips are assured. Scotland, producing more than the population's needs, is allowed to despatch it to Hull as well as London. Apart from Birmingham, all other districts will receive fish from the port allotted to them. Distribution committees will be set up at each port and inland market.

Rye for the National Loaf?

The Government decision to subsidise 1943 rye that is harvested as grain is regarded as a strong indication that the addition of rye to the national loaf may be expected at any time from next July onwards. One reason why the addition has not been made earlier is that the necessary rye has not been grown. The acreage payment of £3, together with the maximum price of 63s. per quarter, is expected to make rye more profitable than any other cereal on light soils and a large expansion in production is already assured.

When production of rye was encouraged by the Government in 1918 the country had 106,000 acres devoted to the crop, but by 1939 production had fallen to 16,000 acres, compared with 54,000 acres at the outbreak of the last war.

The fact that the Government subsidy will *not* be paid on rye grown for fodder emphasises the belief that the Government intention is to use the crop in the national loaf. It is the most reliable cereal to grow on sandy and chalky soils, reclaimed uplands and impoverished land. Rye is only slightly inferior to wheat in food value, but it is difficult to mill. It yields more straw per acre than does wheat, but rye straw is generally unsuitable for fodder. It is very suitable for bedding and thatching.

Rye is sown early—usually in August or September, and ripens in July before the wheat crop is ready. Its addition to the loaf may therefore be expected any time after July, 1943.

Biltong

It has been suggested that Biltong (South African dried meat) might be produced in this country. The method of curing is as follows: "The meat is cut into strips, and into these strips is rubbed a mixture of 1 lb. salt, 2 ozs. brown sugar and 1 oz. saltpetre. The strips are left lying for 24 hours, turned and rubbed well with the mixture again and left for another 12 hours. They are then hung in a dry, cool, windy space till quite dry and hard. It is not necessary for the meat to be hung in the sun."

Two difficulties come to mind—adequate supplies of meat and the general lack of a dry atmosphere in this country.

Storing Green Vegetables

The Swiss mode of winter storage of whole cabbage (known as *Lagerkabis*) seems to be little known outside the country where it originated. A paper by H. Kessler in *Landwirtschaftliches Jahrbuch der Schweiz* (vol. 56, 1942, pp. 344-356) describes with illustrations and a sectional view a new type of building especially designed for the storage of cabbages in heaps. The building is partly sunk into the ground so as to resemble a cellar, but it is provided with its own inclined roof and with tall air-outlets rising considerably above the roof; these outlets and the air-inlets are the essential features of the building, no artificial cooling or heating being provided. An important feature of the arrangement is that the openings of the air-inlets are at ground level, the air being induced to penetrate, by the suction engendered by the outlet stacks, first under the floor; it then rises through openings in the floor and passes around and through the heaps before discharge.

The new type of storage is stated to have worked better than the usual method of keeping the vegetables in ordinary cellars or in concrete storehouses, and to have given at least as good results as an artificially cooled storage. Air temperatures within the new-type building during the relatively warm months of November and December were similar to those of the outside air, while during the frosty months of January to March the temperature in the building only once dropped below the freezing-point. The ideas incorporated in the building may be worthy of consideration outside Switzerland.

Essential Work Order

After negotiations extending over more than two months, it seems doubtful whether milk manufacture and milk distribution will be brought within the provisions of the Essential Work Order. The application on behalf of these sections of the industry was made by the Central Milk Distributive Committee. The Ministry of Food then convened a meeting at which the Ministry of Labour, the milk manufacturers and distributors, the trade unions and certain Scottish interests were represented, and the Ministry of Food expressed willingness to recommend the inclusion of these sections of the milk industry within the scope of the Essential Work Order if satisfactory terms could be agreed.

Government officials made it clear that in any case the enrolment of firms under the Order would be voluntary; that such scheduling would not prevent the calling-up of employees for service in the Forces; but that scheduled firms would receive advantages, particularly in respect of older employees.

The matter was referred to the personnel of the Milk Distributive Trade Board (in their personal capacity and not as a Board) to consider terms. The workers' representatives held the view that the Trade Board scale of wages was not a suitable basis. They considered that employees of firms scheduled under the Order should be recompensed for being deprived of the liberty to sell their labour in a free market. They put forward a suggested scale of wages for scheduled firms. The employers' representatives made counter-proposals.

After several meetings a small margin of about 2s. a week for all classes of workers still separated the two sides. The final meeting, held in September, failed to bridge the gap. The Ministries have now been informed of the failure to reach agreement, and, although the Ministry of Labour has power to take compulsory action, such power has not been exercised in respect of any industry. It is expected, therefore, that nothing further will be done towards extending the provisions of the Order to the manufacturing and distributing sections of the milk industry.

Stream-Lined Drying

Before the war the home consumption of herrings was 600 million annually, half of these being eaten as kippers. We gather, however, that the kippering of herrings is somewhat of a chancy business, requiring a high degree of skill on the part of the person in charge of the smoking, and perhaps a little luck as well. This is because the smoking of herrings has been conducted on traditional lines, and has many of the attributes of a craft, no scientific investigation having been undertaken, so that the process and the product are both variable. As C. L. Cutting, of the Torry (Aberdeen) Research Station of the Department of Scientific and Industrial Research, says: "There would be obvious advantages if the process of smoke-curing could be subject to scientific control; and instead of the enormous variability of the present article, kippers could be produced by a standard process." These remarks occur in *Chemistry and Industry* of August 29 (Vol. 61, pp. 365-368), the paper being entitled "Engineering Problems of the Smoke-Curing of Fish." The kippering procedure is described in detail; also a new type of smoke-kiln designed on aerodynamic principles by J. K. Hardy of the Ditton Laboratory of the D.S.I.R. A new type of smoke-producer is attached to the kiln. Foreign manufacturers who are not familiar with the British kipper should have little difficulty in embarking upon its production, if they wish to do so. As no doubt the contents of the paper will be communicated to British curers and canners of kippers, we do not need to devote much attention now to the details of kippering. But, since smoke-curing is also a drying process, we commend the design of the new kiln—apart from its smoke-box—to any who have low-temperature drying problems. The aerodynamic design seems to represent a real advance, and some figures published in the paper show a very high degree of control of uniformity of air-flow and of moisture in the finished product. As illustrating the soundness of the principles it may be added that the kiln has been used for the thawing of frozen fish "in which uniform transfer of heat instead of water can be effected by such a device supplying an unusually uniform flow of air". The kiln employs the recirculation principle.

Quality Testing of Milk

The new Government scheme for the quality testing of milk will impose additional obligations on milk depots and creameries. The Advisory Committee of the Ministry of Agriculture, which is supervising the scheme, is satisfied that creameries—particularly the smaller ones—have insufficient staff with which to carry out the tests. It will be the duty of the Ministry, and not of the creameries, to make good any deficiencies in personnel. Provincial dairy bacteriologists will appoint additional testers where necessary, and the cost will be met by the Ministry.

The Advisory Committee is of opinion that it should be a condition of a Ministry of Food licence that creameries, No. 1 milk depots and milk processing depots that handle more than a certain gallonage of milk should be equipped with laboratory facilities and that the cost of operating the laboratories should be taken into account by the Ministry in determining the working costs of such creameries and dairies. The Food Ministry is now examining the possibility of including this condition in its licence.

Creameries and depots that handle less than the specified gallonage may either arrange for testing to be carried out by the laboratory staff of another creamery or by a visiting bacteriologist who would attend periodically for this purpose.

Difficulty is being experienced in some districts in obtaining equipment for conducting the tests, and the assistance of the Ministry of Supply has been sought in the matter. Although theoretically all milk of "salvage" quality would be earmarked for manufacture, the Advisory Committee believes that in some cases there may be no alternative but to return such milk to the producer. This raises the question whether payment should be made for the milk. The general view seems to be that the producer should receive the appropriate price as all milk of "salvage" quality will be at the disposal of the Ministry of Food. No plan of price differentiation on the basis of quality is likely to be introduced for some considerable time.

Protein-rich Feeding-stuffs from Potatoes

Of the 2 per cent. protein content of fresh potatoes rather more than one-half is not assimilable by animals. While potatoes themselves cannot, therefore, be regarded as a rich source of protein, the vinasse accumulating as a by-product of potato spirit manufacture contains no less than 24 per cent. protein, calculated on the dry weight. Moreover, the digestible proportion is much higher than in the fresh vegetable, as a consequence of enzymatic and biological modification.

Some 75 per cent. of the total protein in normal vinasse can be recovered, according to D. Fentzloff in a description of current German practice (*Zeitschr. Spiritus-Industrie*, September, 1940). After screening and partial concentration, the liquor is mixed with potato flakes or purée in a cooker at 90° C., whence the slurry is aspirated to a drum drier. The final product, a yellow powder with a pleasant taste, contains 45 to 50 per cent. starch and 20 to 25 per cent. protein. Its keeping qualities are good. With a feeding-stuff value some 25 per cent. higher than that of cereals, it provides an attractive possibility for conservation of cereals in areas where potato spirit is produced on an extensive scale.

The Glycerine-Ammonia Plant

The glycerine-ammonia plant reported from Tashkent by *The Economist* of July 25 is stated to be becoming a substitute for sugar-beet in that neighbourhood.

It is possible that it may be some kind of crop plant of which the name has undergone a sea-change in transmission: our lines of communication with Central Asia are not now much surer or less liable to distortion of messages than they were in the days when stories of the Barbary lamb astonished those who heard them.

The most likely suggestion is that liquorice (Glycerrhiza) is meant. This leaves us without a plausible means of accounting for the ammonia part of the story. But it is true that liquorice is largely grown in Central Asia; that it is capable of yielding a sweetish substance; and that the sugar-cane is not grown in Russia, although sugar-beet is grown there. Hence the only sugar (apart from honey) with which the Tashkentians are likely to be familiar must be beet-sugar; and to them it no doubt appears natural to compare a sweetening agent with that substance. If these suppositions are correct, the new or old use of liquorice to supply a sweetening material does nothing to suggest that species of Glycerrhiza do anything to threaten the position of *Beta vulgaris* (sugar-beet), nor is there reason to suppose that the "glycerine-ammonia plant" has any economic importance as a source of sugar. We accept the report in good faith and imagine that its subject has become somewhat garbled in the course of repeated transmissions since it left the Agricultural Institute of Tashkent to which it has been accredited. Otherwise we should not have devoted any space to the report, and would have mentally dismissed it with the comment that there are, in Turkestan, drinkers of mare's milk, and that possibly they were cultivating the glycerine-ammonia plant for the purpose of using it to line the nests of their favourite animals.

A Curious Food

A note by Mr. Santiago R. Cruz, written from the Philippines in November and published in the April issue of *Agricultural Engineering* (just received), mentions that his most important research was the investigation of "balut-making". This is a local industry which uses a crude but remarkable method of artificial incubation; it was developed in the Philippines and recalls the ancient Egyptian and Chinese methods of incubation in large stoves". *Balut* consists of partially incubated duck eggs; it is extensively consumed in the Philippines. When boiled in water *balut* becomes a nutritious food for children and tubercular adults. It is said to be rich in readily available calcium. The writer stated his intention of conducting a scientific study of balut-making with the view of adapting his electrolytic incubator to improve the process. It has been shown that incubating eggs under conditions of high humidity increases the calcium content of the embryo—presumably by making some of the shell calcium assimilable by the embryo—and the electrolytic incubator is stated to be very suitable for maintaining high humidities. We hope that Mr. Cruz has been spared to continue his work.

The Selection of Refrigerating Equipment

IN DESIGNING a refrigerating plant and drafting a specification, the calculation of the refrigerating duty, the methods by which this duty may be reduced to a minimum in any particular case, and the determination of the correct size of the main plant components are matters which cannot be dealt with briefly and upon which it is not possible to generalise, but some information of a general nature can be given concerning the selection of *types* of refrigerating plant components and the considerations which determine their selection. No hard-and-fast rules can be laid down; it is almost always possible to evolve several different schemes of approximately equal merit, but a start must be made by working out one or two alternatives for closer consideration in detail and selecting types of main components suitable for fitting into these schemes.

Fig. 1.—A room cooled by direct expansion grids on the walls and ceiling, ammonia being the refrigerant employed. There is a considerable accumulation of snow on the coils and it is obviously time that they were defrosted. Before this can be done, however, the room will have to be cleared, involving a good deal of labour.

Three Main Components

A refrigerating plant consists fundamentally of three main components: (1) the compressor, (2) the condenser, (3) the evaporator. It is usual for attention to be focused on the first of these, rather to the neglect of the other two, both of which are of at least equal importance. From the point of view of the user of the plant the evaporator is indeed the most important of the three, since it is the one which actually performs the duty in which he is interested; so, contrary to established custom, it is proposed to deal with this item first.

In refrigerating installations two alternative systems of cooling are employed, known as the "direct expansion system" and the "brine system" respectively. In the former, evaporation of the refrigerant, which produces the cooling effect, takes place in appliances situated at the points where the cooling is to be done. In the brine system, evaporation of the refrigerant takes place in coils of piping submerged in a tank containing a non-freezing solution of calcium chloride brine or some equivalent apparatus. The brine, after being brought to a suitably low temperature, is circulated through the cooling appliances.

For a simple compact installation the direct expansion system is the more efficient and the cheaper to install, but the brine system possesses advantages for large and complicated installations, especially where several different temperatures are required; under such circumstances it is likely to prove preferable to the direct expansion system, on the score of both over-all efficiency and cost of installation.

Types of Cooling Appliances

Cooling appliances, whether using brine or operating on the direct expansion system, may be roughly divided into the following main types: (1) air-cooling grids, brine or direct expansion, for cold rooms with natural air circulation by convection; (2) air coolers, brine or direct expansion, with forced air circulation by power-driven fans; (3) liquid coolers using direct expansion for brine, and either direct expansion or brine for cooling water, oil or other liquids. The second type may be further subdivided into (2*a*) plain tube "dry" type; (2*b*) plain tube with brine wash over the outside of the coils, termed "wet" coolers; (2*c*) gilled or wire-wound tube "dry" type.

Grid Coolers

The cooling of insulated spaces by means of pipe grids on the walls and ceiling is the oldest, and until recently was by far the most widely employed method. For the long-period storage of meat and other goods, where drying by evaporation, which takes place even at temperatures below freezing point, has to be reduced to a minimum, it is still in favour. The disadvantages of the system arise from the deposition of moisture on the grids, which, if the temperature maintained is above freezing point, causes continual drip, or, if below freezing point, results in the grids becoming covered with a deposit of snow, which increases in thickness until its insulating effect seriously reduces the cooling efficiency of the grids. Where grid cooling is installed it is therefore necessary to provide drip-catching trays or gutters beneath all grids in rooms in which the temperature maintained is above freezing point. In low-temperature chambers the grids must be periodically defrosted by passing hot gas from the compressor,

Fig. 2.—Coolers of a special type for fruit stores using the direct expansion ammonia system in connection with ducting.

or warm brine, through them, and clearing away the mixture of snow and water which falls from them.

"Dry" Coolers

In an air cooler with forced air circulation, 1 ft. of piping will perform a cooling duty which would require from 2 to 8 ft. of similar piping used in open cooling grids. It is partly due to this fact that air coolers have, to a large extent, superseded open pipe grids.

Coolers of the cross-grid, plain-tube, "dry" type usually take the form of a bank of tubing contained in a casing. The bank is built up of a large number of flat grids in closely spaced vertical planes, transverse to the current of air which is forced or sucked through the cooler by a fan; the bars of the grids run horizontally and are "staggered" so that the tubes forming the bars in one are opposite to the spaces in adjacent grids. Steel tubes and a casing of steel are usual. Welding is used wherever possible in the construction, and galvanising is widely employed to guard against corrosion, though other methods of protection are sometimes adopted. In most cases a cooler works in connection with a system of ducting, by which the cooled air is distributed. Sometimes ducting is dispensed with; in such cases diffuser nozzles on the cooler are often employed to ensure satisfactory air distribution. Where one cooler serves several chambers or a single large chamber of irregular shape, ducting is essential. As in the case of open grid coolers, the deposition of moisture on the tubes presents a problem. Where the temperature maintained is above freezing point, accumulated snow may be thawed off simply by stopping the circulation of brine or refrigerant and keeping the fan running. In some cases arrangements are provided for passing warm air through the cooler, or hot gas from the compressor, or warm brine through the coils.

"Wet" Coolers

As an alternative to any of these arrangements an air cooler of the "wet" type may be employed, in which the coils are continually washed with cold calcium chloride brine. This arrangement is particularly advantageous where the duty involves the extraction of a large amount of moisture from the circulated air.

"Wet" coolers are smaller than equivalent "dry" coolers, but the equipment required is more elaborate, including circulating pumps for the brine, and it is also necessary to provide for the maintenance of the brine at proper strength, since it becomes progressively diluted by the deposited moisture. This necessitates either the periodical wastage of a part of the brine and the bringing up to strength of the remainder by adding fresh calcium chloride, or the provision of a plant in which the diluted brine is reconcentrated by evaporation; for this purpose some form of heating is needed. A recent design of air cooler of low cost in relation to the duty performed, developed for the use of the Ministry of Food cold stores, is of the plain-tube wet—that is, brine-washed—type, with cooling coils made in the usual form of flat grids. The plane of each grid is vertical, with the tubes forming it running horizontally, but parallel to, instead of transversely across, the air flow.

The bank of cooling coils occupies roughly the upper half of the interior space, and directly below each grid and extending the full length of the grid is a flat steel plate hung vertically. The brine, which flows downwards over each grid from a distributing trough above, wets the plate, thus extending the effective cooling surface by means of material which is considerably cheaper than steel tubing. A further economical extension of effective cooling surface is obtained by other flat plates suspended in the narrow vertical spaces between the grids. These plates are wetted by the splashing of the brine.

Gilled or Wire-Wound Tube Type

Air coolers of the gilled or wire-wound tube type are generally similar to plain-tube, dry-type air coolers, but are smaller for a given duty, owing to the higher efficiency of the gilled or wire-wound tubes, and usually work on the direct expansion system. They merit consideration principally where the temperature to be maintained is above freezing point, and especially, therefore, in connection with air conditioning. They generally, but not invariably, operate on the "dry" system, and are then unsuitable for temperatures below freezing point, since under these conditions snow accumulates rapidly on the gills or wire, filling the

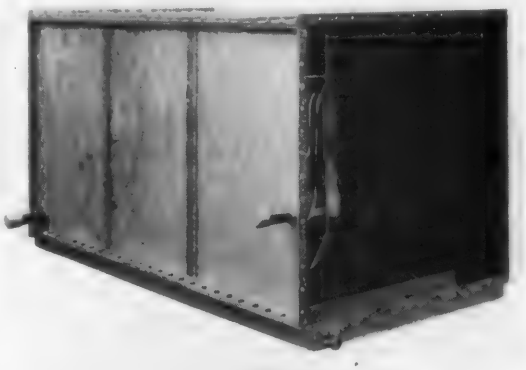

Fig. 3.—A view of a direct expansion dry type cooler with wire-wound tubes. The refrigerant is freon.

Fig. 4.—A cooler contained in an insulated tank for cooling a liquid—brine or water—as may be required. The motors on the left drive circulating pumps.

spaces through which the air should pass, choking the whole cooler, causing a serious reduction in cooling duty and necessitating far too frequent defrosting. Where the temperature to be maintained is above freezing point and the duty does not entail the continual removal from the air of a considerable amount of moisture, the accumulation of snow on the coils is not so rapid as to call for defrosting at undesirably frequent intervals. The arrangements for this operation may be on the lines already described.

As regards appliances for cooling liquids, on account of the widely differing purposes to which they are applied and the consequent diversity of designs, it is unfortunately impracticable to give information of a general nature on types and their selection. It may be remarked, however, that some liquid coolers, particularly those used for brine or water cooling, closely resemble certain types of water-cooled non-evaporative condensers; to be precise, those generally known as the " shell and tube " and " multipass " types respectively.

Selection of a Compressor

The selection of the most suitable type of compressor for a refrigerating installation is governed, in the first place, by the refrigerant to be employed. In the majority of cases, where large or medium size plants are concerned, the unhesitating choice will be anhydrous ammonia, since this possesses advantages in respect of efficiency, cost of plant and the wide range of standardised sizes and types of compressors and other equipment available from all makers. Certain considerations, not usually amounting to determining factors, may, however, become of overriding importance in special cases, and may lead to the selection of an alternative refrigerant.

In the case of small plants, equipment designed for methyl chloride or freon is more generally available and is of approximately equal merit from any other point of view. Where it is essential that the refrigerant employed should be practically harmless in the event of serious leakage or the escape of the whole charge, the choice lies between carbon dioxide and freon. The disadvantage of the former is the low efficiency and high cost of the plant, the refrigerant itself being cheap and easily obtainable almost anywhere. In the case of freon, the objections to its use are the high cost of the plant in comparison with an installation using ammonia, the very high cost of the refrigerant itself, and the difficulty at present experienced in obtaining it, to which must be added the limited range available of standardised equipment designed for use with this particular refrigerant.

High and Medium Speed Compressors

Refrigerating compressors of the slow-speed type with open motion work, whether of the horizontal or vertical pattern, are now obsolete. Most modern machines, with the exception of marine-type CO_2 compressors, are of the vertical totally enclosed pattern, single acting, with trunk pistons. All except the smallest sizes have forced lubrication. There are two varieties of this type, which may be roughly classified as high-speed and medium-speed machines. Generally it may be said that for large units the high-speed type will be preferred, and the medium-speed type selected for those of small or moderate size. The former run at speeds which render them suitable for coupling direct to electric motors or internal-combustion engines, while the latter, being designed to run at somewhat lower speeds than the usual prime movers, must be driven by belt or through some form of speed-reduction gear.

The introduction of the highly efficient multiple vee-belt drive permits the distance between compressor and motor to be reduced so much that the space occupied is no more than that required for a direct-coupled set. The result has been the frequent adoption of this drive even for high-speed compressors, since it enables a smaller, and therefore cheaper, electric motor to be employed, which has the additional advantage of being normally obtainable from stock. In connection with electric motors for driving refrigerating compressors it is worth mentioning that, by installing those of the auto-synchronous type, power factor correction for the whole installation is obtained, which results in a reduction in the cost of electric power and a saving of coal at the generating station.

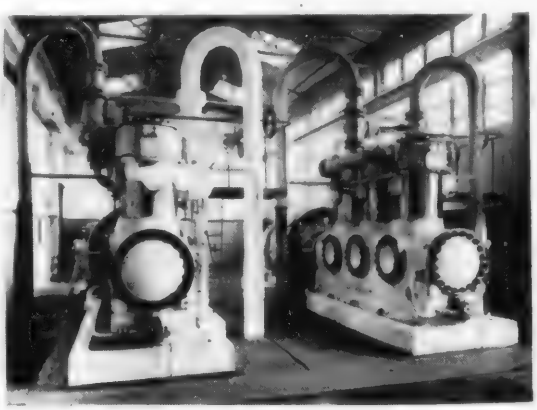

Fig. 5.—Two large ammonia compressors of the vertical enclosed high-speed type direct-coupled to the electric motors. Installed in a freezing works in New Zealand.

The Condenser

Turning to a consideration of main component No. 2, the condenser, a refrigerating plant is a heat-pumping installation which reverses the natural direction of flow and transfers heat from a region of low to one of high temperature. This region of high temperature is the condenser, in which the heat is transferred to the substance, usually water, used for cooling purposes. In the process of giving up the transferred heat to the cooling medium the refrigerant condenses to a liquid.

The condensers usually employed are of three main types: (1) air-cooled, (2) water-cooled non-evaporative, (3) water-cooled evaporative.

Each of these is made in a wide variety of designs to suit particular conditions, but the broad selection of a type is governed by the following considerations. The air-cooled condenser is suitable only for small installations and where it can be placed so that an ample and continuous supply of cool fresh air is available. For large installations it becomes unwieldy in size, difficult and expensive to install, low in efficiency and costly in operation, on account of the considerable power required for the fan to produce the necessary forced circulation of air.

Water-Cooled Condensers

Water-cooled condensers of the non-evaporative type are used where there is an ample and cheap supply of water at a suitable temperature, the source of which may be town's main, well, river, canal, lake or sea. The question of whether the water is clean or dirty, whether it has corrosive properties, a tendency to form scale, deposit sludge or give rise to vegetable growths must be taken into account in selecting the particular design of condenser to be installed. This type, using mains water, is generally the most suitable alternative to the air-cooled type for plants up to about 15 h.p. The quantity of water required is, however, considerable, and its cost is often greater than the cost of electric power for the compressor motor.

Evaporative Condenser

The evaporative condenser is the most widely used of the three main types, especially in large installations and where water for cooling purposes is limited in quantity or costly. Condensers of this type effect the dissipation of the heat of condensation of the refrigerant by the evaporation to atmosphere of a part of the cooling water. This loss has to be replaced, but the nett saving of water, compared to the quantity required by an equivalent condenser of the non-evaporative type, amounts to 95 to 98 per cent. There are two types of evaporative condenser—the atmospheric type which relies on natural air circulation and must be erected in the open, either on the roof of the building or in an exposed situation, and the forced draught evaporative condenser, sometimes termed the "economiser condenser", in which the coils are enclosed in a housing through which a current of air is forced by a power-driven fan. Condensers of this last type are smaller than equivalent atmospheric condensers, and are used where space is not available or a suitable situation cannot be found for an atmospheric condenser. The economy in cooling water is roughly the same for the forced draught evaporative as for the atmospheric type, but in the case of the former the power required for the fan may add as much as 20 per cent. or even 25 per cent. to the power needed for the whole installation.

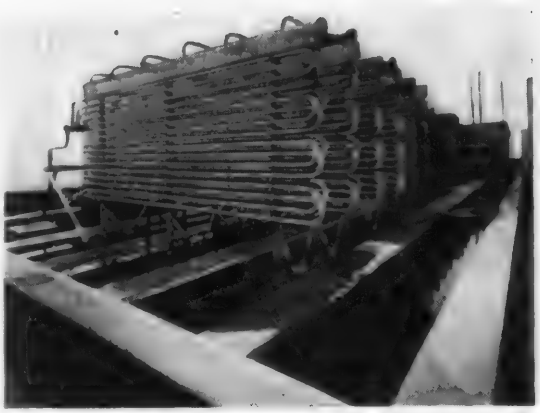

Fig. 6.—An atmospheric condenser for CO_2. The stacks nearest to the camera are of what is known as the interlaced coil type, while those more remote are of the oval coil type.

As an alternative to the evaporative type, where water is scarce or expensive, and where an air-cooled condenser is unsuitable, the water-cooled non-evaporative type may still be employed with a water-cooling tower or spray-cooling pond, if either can be accommodated on the site. This system is as satisfactory as the use of an evaporative type of condenser in respect of economy in water.

The Final Selection

Assuming that some prospective purchaser of refrigerating plant has been sufficiently interested to follow these remarks up to the present point, unless he happens already to possess expert knowledge of the subject he may either be in a state of some uncertainty as to what will best meet his requirements, or may have reached some definite conclusions as to the types of certain items of equipment suited to his particular purpose. In either case he will need to consult a firm of refrigerating engineers, but should at least be in a position to give them information of precisely the kind required in the preparation of a satisfactory scheme and estimate, or to discuss intelligently with them his tentative selection of plant.

ACKNOWLEDGMENT. The photographs which illustrate this article are reproduced by the courtesy of Messrs. J. & E. Hall, Ltd.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

Wartime Problems in the Bakery

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National Bakery School.

THE WAR has brought bakers and confectioners many unexpected problems to solve, and there is no doubt that it will bring many more yet. It is doubtful if anyone inside or outside the trade visualised the present position with regard to confectionery. It is quite beyond anticipation that, after three years of war, confectioners are still able to produce so many varieties of confectionery in such large quantities and still find the demand far exceeds the supply.

It is fairly safe to say that in spite of the restrictions in the quantities of fats and sugars available, and also in spite of the disappearance at times of other important cake ingredients, more cakes are being made to-day than were made prior to the war. This has been achieved by the adaptability of confectioners in altering their mixings and methods, adopting different styles of cakes, and using some of the excellent substitutes with a good food value that have been available.

Sugar and Fat Shortages Overcome

A few years ago there was a definite tendency for confectioners to use more sugar in their cake mixings in order to get a soft moist-eating crumb, while many thought that good cakes could not be made with less than 20 per cent. sugar, and that the best quantity of sugar to use when cake making was about 25 per cent. of the total weight of the batters. Since rationing of sugar started, and the increased demand for confectionery, many bakers are now producing excellent cakes in which only about 16 per cent. sugar is used in the total ingredients. This has been achieved by rebalancing the mixtures and by slight alterations in the methods of production. When less sugar is used in a cake mixing more baking powder is required to give the necessary lift and softness of crumb to the cakes.

The problem of fat shortage has been partially solved by the use of cheaper mixings and the elimination of all the better class cake mixings which used up large quantities of fat. Food scientists have been busy on this problem, and there are now a few fat-saving materials available for the bakers which, when used with the available fat, will give rich-looking cakes capable of retaining their moistness very well. These fat-saving materials are mostly emulsifying agents which enable the available fat to carry more moisture in the cakes.

Food value has been added to many of the cheaper types of cakes by the utilisation of soya flour products. Many of the best egg and milk substitutes that have been available for bakers have carried a considerable proportion of this material. It is now also being advocated as a fat-saving material. These soya flour products have certainly been a boon to confectioners during the present war.

Sponge Goods with Dried Eggs

Since the introduction of dried eggs to all bakeries in place of the shell or frozen variety, many problems have had to be solved by those who have had to use them. They acted nearly as well in cake batters as the frozen type of eggs. Only a very small quantity of extra chemical aeration was required to get cakes of the usual volume and softness.

It was thought that it would be almost impossible to turn out first-class sponge products with them. Investigators have been busy on tests with the reconstituted eggs for the past year or more—trying their best to make reasonably good sponge products with them. It is only recently that the problem has been solved, and it is now possible to make good sponge products without too much chemical aeration and by a foolproof method. The method apparently upsets some preconceived ideas on the uses of eggs and how they will whisk up. It was generally thought that if flour or any other starch substance was added to the sugar and egg during whisking the aerating properties of the eggs would be destroyed. Now, however, when sponge goods are to be made, the recommendation is to add a proportion of flour to the sponge batter in order to take up some of the moisture, and so make it possible to get quite a good aeration when the eggs are whisked.

The following is a recipe and method for making the best quality sponge cakes and sandwiches with the reconstituted dried eggs :

2 pints eggs.	¾ lb. flour.
2 lbs. sugar.	1¼ lbs. scone flour.

The eggs, sugar, and flour are placed in a bowl, and without any preliminary heating are whisked on top speed for about 20 minutes, until they will not carry any more air. The scone flour is then lightly mixed in, and the sponges are dropped out as usual, and baked in a moderately hot oven, about 400° F.

A slightly cheaper sponge can be obtained from the following recipe made up by the same method :

2 pints eggs.	12 ozs. milk.
3 lbs. sugar.	2½ lbs. scone flour.
½ lb. flour.	

The milk is mixed in after the 20 minutes whisking of the eggs, sugar, and flour; the scone flour is then lightly mixed in.

Excellent Swiss rolls can also be made with the reconstituted dried eggs by the same method from the following recipe :

2 pints eggs.	8 ozs. milk.
2 lbs. sugar.	1¼ lbs. scone flour.
¾ lb. flour.	

The scone flour for the above recipes should be the usual recipe made by sifting ¾ oz. baking powder and ¼ oz. salt with each pound of flour required.

It is quite an achievement for bakers to be able to make good sponge products with the reconstituted dried egg, especially after there had been so many failures in trying to do so.

Use of Ammonium Bicarbonate in Confectionery

With such an increased demand for extra confectionery, and with the failure of supplies of cream of

tartar, and the consequent shortage of baking powders, bakers have been seeking alternative means of aerating their products. Some have been trying acids alternative to the usual pyrophosphate cream powders to enable them to neutralise the bicarbonate of soda which they use in the chemical aeration of confectionery. Acetic acid and vinegar have been used to a small extent for this purpose with quite successful results. Some recent investigations on the part of the author have proved that an alternative means of aerating confectionery and cakes is offered by ammonium bicarbonate. It is probable that many will be far too conservative to use this means of aeration, expecting it to leave a residue of ammonia in their cakes, but this is not so. The cakes smell faintly of ammonia when newly baked, but it quickly passes away, and no trace of ammonia is left.

It was during the last war that bakers in Germany first used ammonium bicarbonate in place of ammonium carbonate, or "Vol", as it is generally called by bakers in this country. The Germans at that time were looking for a substance for aerating their bread in place of yeast, baking acids, and bicarbonate of soda, which were in short supply. It was first suggested that ammonium carbonate should be used, but when this was tried there were numerous complaints about the ammoniacal smell and taste of the bread. Suggestions were then made that ammonium bicarbonate should be tried for this purpose as it did not contain so much ammonia, but it was expected that it would have a less marked rising effect than the carbonate per unit weight. Actually, it was found in practice to be more efficient and to be superior to the carbonate. This was first demonstrated in an investigation carried out at the Experimental Station for Corn Utilisation in Berlin. Later, the comparative effect of these two ammonium compounds and of ammonium carbamate were investigated in the Food Research Laboratories, Munich, when the superiority of the ammonium bicarbonate was conclusively demonstrated. It was then concluded that the raising effect is greatest when the proportion of ammonia associated with the carbon dioxide is low.

New Investigations

The investigation aroused considerable interest in Germany, and since that time ammonium bicarbonate has to a great extent displaced ammonium carbonate as a baking chemical in European bakeries. It has also increased in popularity in other countries abroad, especially U.S.A., where it is now being widely used as the leavening agent in sugar cookie mixtures and by biscuit bakers. Biscuit bakers in the British Isles are now being urged to use ammonium bicarbonate in place of ammonium carbonate in the manufacture of biscuits. There is at least one manufacturer in Northern Ireland who has gone over completely to the former.

Experiments have been in progress for some time to investigate the effect of ammonium bicarbonate when used in place of the carbonate and also when used in place of baking powder in cakes, etc.

Ammonium carbonate was chiefly used in small porous articles such as biscuits, which permits of the escape of the gases. It was also used by bakers in cheap cakes where a quick lift was required in the products, and also in the making of *Choux* pastries.

The experiments so far carried out have revealed that in every case where ammonium bicarbonate was used in place of ammonium carbonate the products were better flavoured, lighter or shorter, and had less smell of ammonia when fresh, and what smell they had disappeared quicker than those made with the carbonate. It is also true to state that the volume of the products was greater when the bicarbonate was used, and the products appeared softer and spongier.

Since ammonia is a chemical of national importance at the present time, it is highly important that it should not be wasted in baking, especially since better results can be obtained with the bicarbonate, which does not contain so much ammonia. All biscuit bakers in this country would be doing a national service and also improve their biscuits if they went over to the ammonium bicarbonate to aerate their biscuits.

Replacement of Baking Powder

Tests have also revealed that ammonium bicarbonate can also be used to replace or partially replace baking powder in the making of cakes. Some cakes have been made with this chemical as the only aerating agent present, while others have been made with a small proportion of this chemical and some of the usual baking powder to aerate them. It was surprising to find that those cakes made with ammonium bicarbonate were greater in volume and had a softer crumb than those made with the mixture of this ammonium bicarbonate and baking powder. The latter were also better volumed and softer than those in which baking powder was the only aerating agent used. As in the other cases, there is a slight smell of ammonia when the cakes are withdrawn from the oven when the ammonium bicarbonate is used, but this quickly disappears, and when the cakes are cool there is neither smell nor taste of ammonia.

A considerable saving in baking powder can be made if ammonium bicarbonate is used either to replace or partially replace it in the making of cakes. There is also a considerable saving in cost, as the ammonium bicarbonate is considerably cheaper than baking powder and less of it has to be used to get the same effect.

It has been established that it only requires ½ oz. ammonium bicarbonate to replace ¾ oz. baking powder in cake-making recipes.

Dried Fruits

Dried fruits have presented another problem to the bakers. Twenty-five per cent. of the dried fruit allotted to bakers has been in the form of prunes, apple rings, apricots, or figs. These are forms of fruit with which bakers have not been very familiar. Those who refused these types of dried fruits could not have their allotment made up with currants or sultanas, so they had perforce to take what types they could get and learn how to use them in the making of palatable confectionery. It has been found that if these fruits are soaked for 24 to 48 hours in nearly their own weight of water they will take up the moisture and become quite soft and eatable. Prunes can then be easily stoned and mixed with some cake crumbs and sugar to make a palatable filling, or they can be used whole to make prune tarts. Apple rings can also be softened by soaking in water before using to make good apple pies and slices. Apricots will also take up considerable

quantities of water, and can be used to make apricot pies [illegible] slices. Figs will also take up large quantities of water and as they contain about 65 per cent. sugars they can be used, after soaking, in cake making, where they help very considerably to sweeten the cakes and save some sugar in the products in which they are used.

Emergency Breadmaking

Much work has been done behind the scenes in finding out the best methods of producing bread with the minimum quantity of yeast when the emergency arises. Yeast supplies may run short at any time owing to varying circumstances, and all bakers have been urged to carry at least four days' supply of yeast. They are also being taught methods of making this four days' supply last at least eight days, and, if the necessity arises, how to make it last from six to seven weeks.

Instructions have been issued to bakers, and lecturers appointed to demonstrate to them how to make their normal quantity of bread with the minimum quantity of yeast in the usual short period. Twelve ozs. yeast may be used in place of 2 lbs. by the simple method of increasing the dough temperature and reducing the salt content, so that bread can be made in the usual time allotted to the process.

Two ozs. yeast can be used per sack of flour by using the overnight quarter-sponge and short-dough method, making the dough warmer than normal. Booklets are being issued to bakers on this subject of emergency breadmaking methods, where full details will be found. A panel of lecturers has also been drawn up to teach the bakers the various emergency methods of breadmaking.

Methods of preserving yeast have also been investigated, and it has been found that yeast can be stored in sterile containers for at least six weeks in a cool place and still retain its activity.

Barm-making methods have also been the subject of investigation, but it has been felt that many bakers cannot make barms owing to the scarcity of utensils required for this purpose. The malt extract barm method is the only one of the barm-making methods that is really suitable for the majority of bakers. The following is a method :

1 gallon water at 70° F.
1½ lbs. low diastatic malt extract.
5 ozs. yeast.

Whisk these ingredients well together and allow to stand for 18 hours. This barm can be used at any time from 18 to 48 hours after making.

It is used at the rate of 1 gallon per sack of flour to mature a dough in 6 hours, the dough temperature being about 80° to 82° F. Old barm can be used to start a new barm when it is about 48 hours old, using 1 part barm to 6 of liquor. Three ozs. of dried yeast may be used as a first starter.

The Leaven Process

A system of breadmaking by the ancient leaven process has also been investigated, and it has been found that it will be possible to carry on making a type of bread if yeast supplies fail altogether.

All bakers should carry a stock of dried yeast. Some samples tested have good ripening and aerating properties, and can be used in all breadmaking processes in half to three-quarters the usual quantity of yeast. Other samples are not quite so good, but all of them have some property of ripening and gassing, so that a supply should be kept handy in case of necessity.

Bakers are urged to test the various emergency methods of breadmaking in order to become familiar with them in case of necessity.

One thing is certain, in spite of the conservatism of the majority of bakers, they will always do their best to keep up the supply of bread and other foodstuffs to the public, and adapt themselves to the circumstances of the occasion. There need be no fear of a food shortage so long as bakers can get the necessary supplies of the main ingredients for the production of their products.

MINISTRY OF FOOD

Compulsory Margarine Stocks

Under S.R. & O. 1942, No. 1500, retailers are obliged to carry minimum stocks of certain commodities, including margarine.

The Ministry of Food, knowing the perishable nature of such goods, appeals to traders to exercise even more than their normal care in the storage of margarine and in selling it in strict rotation.

If due regard is paid to these details, there will be no cause for fear, but, on the other hand, lack of such attention may result in the loss of valuable foodstuffs and in financial loss for which no claims can be entertained.

Food Control Committee

As the result of three years' experience, the Minister of Food has introduced a new Order to replace the Food Control Committees (Constitution) Order, 1939. By this Order all existing committees will be dissolved on December 31 and new committees appointed on January 1 to operate for one year. Casual vacancies will be filled as they arise, and any member will be eligible for appointment for the following year.

Some of the qualifications for membership have been broadened; for instance, caterers and shop assistants will be eligible as trade members. Any person will be eligible as a consumer member who is not in any way connected with food business and who is not regularly employed by the Ministry.

The committee and all sub-committees must contain a majority of consumer members.

Food Control Committees are appointed by local authorities, or in some cases by two or more local authorities jointly. They are not, however, committees of the council, but Ministry of Food Committees deriving their powers from the Minister of Food.

The Order took effect on September 14, 1942.

(Continued on page 293)

Some Practical Aspects of Leaf Protein Manufacture

The purpose of this article is to suggest that, with modern technique, the leaves of plants themselves might be used as raw material by the food industry. Leaves for this purpose would be obtained in two ways: they might be grown as a special crop, or they might be the by-product in the making of some other desirable vegetable product. In the former case it is necessary to show that a larger, or more valuable, yield of material suitable for human consumption would be got by harvesting the leaves than by growing any of the probable alternative crops; in the latter case it is only necessary to show that the leaves, which would otherwise be wasted, can be handled economically.

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Rothamsted Experimental Station.

MOST FOODSTUFFS are made either directly or indirectly from the leaves of plants. The process of conversion may be carried through by the plant itself, as is the case when an edible grain, tuber or fruit is made; it may, on the other hand, be carried out by a herbivorous animal that is fed on the leaves and then supplies us with meat or milk. These conversions are never carried through with great efficiency; some representative figures for this efficiency of conversion are given in Table I.

TABLE I.

100 lbs. of digestible feeding-stuff protein gives in the following animals, under the conditions specified, the following yields of protein for human consumption:

	Figures from Halnan.[3]	*Figures from Leitch and Godden.*[4]
	lb.	*lb.*
Cow, stall fed and giving 2 gallons of milk daily ...	36	35
Cow, taking its whole life, with milk and calves, into consideration	—	18
Hen, laying 140 eggs a year	32	—
" " 120 "	—	19
" " 200 "	—	28
(These figures are for the eggs only)		
Hen as a source of meat ...	18	26
Pig, as pork	21	19
Sheep, as lamb	—	13
Bullock, as baby beef ...	8.	14
" as grass-fattened beef	5	9

Composition of Leaves

Leaves contain a wide range of different substances, but protein, fat, carbohydrate, fibre and flavouring materials may be mentioned especially. The preparation of the last two from leaves is already a well-established practice and need not be emphasised here. Fat and carbohydrate could be prepared, but it is unlikely that leaves would offer any advantage over existing raw materials except in special cases. It is as a protein source that leaves are most likely to be of use, and attention will here be confined to this leaf constituent.

There is a widely held view that proteins of vegetable origin are of less value in nutrition than those of animal origin. This has come about because the only vegetable proteins that generally come up for consideration are those of grains such as wheat and maize; the principal proteins of these grains, gliadin and zein, are certainly deficient in some amino acids that are known to be essential for the nutrition of the rat and that are probably essential for human nutrition. These deficiencies can, in general, be overcome by feeding a diet containing a mixture of proteins, so that any deficiency in one protein may be compensated for by the other proteins.

The leaf, unlike the resting seed, is an actively metabolising system, and the protein that is isolated from it is a mixture of many different individual proteins with different properties and compositions. From first principles, therefore, it is unlikely that any particular amino acid will be deficient in all these different proteins at once, and this expectation is borne out by amino acid determinations on the mixture.[1] These published figures refer to protein preparations strictly comparable to those that would be made under the scheme outlined here, and they show that this part of the total protein of the leaf has an amino acid composition similar to that of the " first-class " proteins.

Protein Content

The amount of protein in leaves from the same species and even at the same stage of development is variable, and so is the amount that can be easily extracted. The time of year, weather and intensity of manuring influence the first variable; the factors influencing the second are but little understood.

Total nitrogen contents have been measured for many crops under many different conditions,[9] and these figures may be used as a guide in assessing the possible protein productivity of an acre. Experience suggests that two-thirds of the total nitrogen in a leaf is generally present in the form of true protein and that the proportion is often higher than this. The remainder is in the form of free amino acids and other nitrogenous substances of low molecular weight. In the scheme that is being considered this part of the leaf nitrogen would be lost, but it would be possible to recover it if the waste liquors were used for yeast culture.

Much information is already available on the cultivation and cropping of a large group of plants which, if harvested young and properly tended, will give good yields of leaves containing 3 to 5 per cent. of nitrogen in terms of the dry matter. If the usual assumptions are made, this corresponds to about 16 to 26 per cent. of protein. The group includes most of the grasses and legumes and a few other crops such as comfrey.

Protein preparations have not been made on any appreciable scale from the leaves of all these plants, but preparations have been made in the laboratory from such a wide range of plants that it is unlikely that such an attempt would fail.

Separation of Leaf Components

The principles underlying the separation of the components of a mixture are comparatively simple and well understood; a property by which the required substance differs from most of the other components in the mixture is studied, and use is made of this in separation. Thus oil can be separated from ground nuts because, once it is liberated, it will pass through the slots or perforations of a press or expeller, and wheat is separated from chaff by making use of the readiness with which the latter is carried in a stream of air.

Two properties are used in the separation of protein from leaves: in the first place, the protein can be dissolved or finely dispersed in water and so is separable from the leaf fibre; in the second place, it is coagulable and so can be separated from the other soluble components.

The leaves from which it is likely that protein would be made contain 80 to 90 per cent. of water when fresh. Little or no extra water is therefore needed to bring the protein out. The greater part of the water and protein is carried inside the leaf cells, and simple pressure does not lead to its liberation. An essential preliminary to the extraction of leaf protein is therefore some form of rubbing or maceration of leaves, either against parts of a machine or against one another, so that the cell sap is liberated. After this treatment the sap can be separated from the leaf residue by comparatively gentle pressure. The residue that is left after pressing still contains 50 to 60 per cent. of water, and this water holds in it some of the soluble protein; by extraction with more water part of this can be recovered.

There are other possible advantages in this further extraction. In many leaves the concentration of salts and other constituents in the sap is so high that part of the protein is precipitated and stays attached to the fibre; simple dilution will liberate this. The sap from most of the forage crops has a pH in the range of 5·2 to 6·5; at the acid end of this range part of the normal leaf protein is already precipitated, and for satisfactory liberation it would be necessary to neutralise the mass. This is most conveniently accomplished by re-extracting the residue with dilute alkali.

Effects of Maceration

Most leaves when macerated and pressed give a green turbid liquor; starch grains settle out of this quickly and the fragments of chloroplasts separate more slowly; the latter carry much of the protein with them. After a few hours a more general coagulation of protein sets in; this phase is completed in twenty-four hours at room temperature. Some protein remains in the brown fluid, and this can be coagulated by heating to 70° to 80° C. There seems to be no advantage in practice in separating these two protein fractions from one another and, perhaps after allowing the starch and any grit that may have got into the leaf sap to settle, all the protein can be coagulated together by heating. Other methods of separating leaf proteins from solution—*e.g.*, by the addition of salts or by precipitation at the isoelectric point—are well known to those who handle leaves, but they seem to offer no practical advantage over heating. The coagulum that has been separated in this way is generally about two-thirds protein; the remainder is made up of lipoids, mineral matter and fibre. For most purposes it would need refining, and it can therefore be looked on as a raw material in any use that may be made of leaf protein in the food industry.

Distribution of Protein

When leaves are macerated and pressed or extracted a part of the protein comes out in the extract and part remains attached to the fibre. It is difficult to get this off except by hydrolysis. The proportion of the protein that is extractable varies with the species and with the total protein content, but one-third is a fair average value. Under these conditions a residue will be left which contains the fibre of the leaf and two-thirds of its protein; this, if leaves of high original protein content have been used, would be a valuable source of winter feed for cattle. Its conservation by drying presents no difficulty, for a substantially similar product is already dried in the R.G. Foods process of grass drying. Briefly, therefore, what is proposed is the growing of forage crops which would then be separated into as large a yield as possible of leaf protein and a residue suitable for cattle feeding; this would be done on part of the six million acres of land at present used for the production of hay. It is probable that a larger yield of material available for immediate use as human food would be got from an equal acreage under beans or potatoes, but much of the land with which we are concerned is not suitable for these crops, and a supply of winter feeding-stuffs is obviously of great importance in maintaining the milk supply.

The Uses for Leaf Protein

Three uses for leaf protein are immediately obvious: as a substitute for casein in industrial use, as an animal feeding-stuff, as a human food. With the first we are not concerned; its only connection with food manufacture would be the restoration to that industry of some of the milk now used for such purposes as plastics manufacture.

For animal feeding the raw product would probably be suitable without further treatment. Pigs and chickens can be fed to only a limited extent on leaves,

even when these have been dried and ground. The original suggestion that the juice got by macerating the leaves could be used even when the leaves themselves are unsuitable was made by Ereky,[3] but it does not appear to have been followed up, presumably because of the cheapness, under normal conditions, of alternative feeding-stuffs.

Products that are nearly colourless and tasteless can readily be made from the crude protein by washing with water and organic solvents. This treatment removes fats and chlorophyll, and the value of these may cover the costs of the refining, for the crude protein is a more concentrated source of these constituents than the leaves from which it was derived. By judicious partial hydrolysis the tasteless and insoluble leaf protein preparations can be rendered soluble and can be given the somewhat meaty flavour that is characteristic of protein hydrolysates. It is a matter for experiment rather than *a priori* judgment whether it would be better to use the protein itself or a product of its digestion.

Sources of Leaf Protein

The most obvious source of leaf protein is leafy material that is grown for the sake of some other part of the plant and then not used at all or inadequately used; as examples sugar-beet, potatoes, sisal and sugar-cane may be mentioned. In this country a certain amount of silage is made from sugar-beet tops, but to a great extent they are wasted. In Germany, on the other hand, some effort has been devoted to the development of machinery for the washing and pulping of the tops. The reports on this process do not make it clear whether the liquor that is expressed from the pulp is fed directly to pigs or whether the protein is precipitated first, as in the scheme advocated here.

The former course would have the advantage that the sugar of the leaves would be used also, but it would demand a rather close connection between factory and farm on account of the readiness with which an expressed sap putrefies. Potatoes are, as a rule, left in the ground until the top has completely withered, but in some parts of the country where the tops persist green late in the season it is usual to destroy the tops by spraying with sulphuric acid or even by mowing. When this course is adopted a large amount of leafy material, from which protein could be prepared, is being wasted.

Use of Waste Materials

An objection that is sometimes raised against the use of potato haulms depends on the presence of the poisonous alkaloid solanin in them. It appears, however, that by the end of the season this has largely disappeared (*cf.* Schnieder[7]), and in any event it would be washed out in the liquor that runs away from the protein coagulum.

Many attempts have already been made to use the abundant waste that is associated with the preparation of sisal fibre, and the results have been gathered together by H. H. Smith.[8] For every pound of fibre that is made about 30 lbs. of leaf pulp has to be disposed of. This pulp contains about 10 per cent. of dry matter, and the dry matter is on the average 12 per cent. protein. These three materials are not rich protein sources; the tops of beets and potatoes also contain about 12 per cent. of protein, but they deserve attention because they are already abundantly available in certain areas. Sugar-cane tops come in the same category; they contain from 0·8 to 2·5 per cent. of nitrogen,[10] and little or no use has so far been found for them. It may also be well to bear in mind the likelihood that the development of rubber production from guayule and saghyz plants will lead to very large amounts of waste leafy material and that this may be of use as a protein source.

Comparison of Protein Sources

The protein sources that have been mentioned so far are freely available as waste products; if the technical difficulties in the extraction can be overcome sufficiently cheaply, no other difficulty in setting up a leaf protein industry need be envisaged. The industry would only have to meet the cost of carting the raw material, and with some crops—for example, sisal and potatoes—the producer would probably pay to have a troublesome waste taken away. The main defect of these raw materials is their low protein content, for the experience that biochemists have acquired with a wide range of leaves suggests that the proportion of the total protein of a leaf that is easily extractable becomes smaller the smaller the total protein content.

When the growing of special crops, primarily for leaf protein manufacture, is considered, it is necessary to compare the productivity of this type of husbandry with probable alternatives. There are two aspects to this question, and we have to consider in the first place the position of a leaf protein industry in a world with free international trade so that crops are grown under the most suitable conditions and then transported to wherever they are needed. In the second place, under wartime conditions, a method of making, in this country, a material that would otherwise have to be imported has a special importance.

The main sources of protein for industrial or nutritional use are animal products and the seeds of legumes. In peacetime these are so cheap that it is likely that leaf protein from special crops could only compete with them if made under very favourable climatic conditions—for example, in New Zealand. The position would no doubt alter if experience were gained through handling such leaf material as is already available, but there is at present no firm basis for making the necessary estimates. In wartime it is less easy to get products with a high protein content, and this stringency is the cause of the re-awakening of interest in projects for making protein from leaves grown here.[5, 6]

Home-Grown Supplies

Cereals and potatoes are the outstanding food crops grown in this country, but the protein content of both of these is rather low. In peacetime this deficiency is corrected by meat, milk, eggs and fish; in the absence of this supplement the diet must be looked upon as containing less than an optimal amount of protein. Home-grown supplies of protein can be got by increasing the production of peas and beans suitable for human consumption, by increasing the yield of forage crops for cattle feed and by preparing leaf protein. These three courses of action are supplementary and should not be looked on as alternatives. Yields of one ton of dried beans from an acre are easily achieved; this corresponds to 560 lbs. of protein. The straw that is got at the same time is of low feeding value. Peas give a

similar protein yield, and the haulms and pods contain 10 to 11 per cent. of protein in terms of the dry matter; if the peas are taken when green the haulms could probably be used as raw material for leaf protein manufacture.

Where weather conditions are suitable for ripening and where labour is available for harvesting there is obviously much to be said for the growing of peas and beans as a protein supplement to the protein deficient home-grown diet, but the small acreage at present devoted to them suggests that an extension of this crop will not itself supply the necessary protein.

Forage Crops

The forage crops give a rather higher protein yield than these legumes, but they are only suitable, without pre-treatment, for feeding to ruminants. Watson gives[9] yields for maize, rape, comfrey, lucerne, and pasture mixtures ranging from 1,000 to 1,700 lbs. of crude protein per acre per year. Yields as high as these might be difficult to achieve on a large scale in practice, but the crops are not dependent on fine weather for ripening and only demand that the rainfall should be adequate throughout the summer. These conditions generally occur in the West of Britain, and it is suggested that in this area it might be better to devote land primarily to the production of leaf protein than to many of the uses to which it is now devoted.

Yields from Different Crops

As has already been pointed out, winter feed for cattle would be an important by-product of leaf protein manufacture; it is, therefore, natural to consider the effect this would have on the amount of food available for cattle.

This article is, in part, a plea for the initiation of experimental work on the yields that can be expected from different crops. Until this work has been done it is only possible to guess the yields under the alternative methods of using land. Clearly, if the whole of a leafy crop is conserved for cattle feeding, more will be available for the animal than if part of the crop has been extracted for use as human food. In practice, however, the crop intended as a source of protein would have been manured to an extent that would not have been feasible had the crop been intended as cattle food only. The extra yield due to this manuring will compensate for the amount of material removed as leaf protein, so that the final dry weight of the residue will approximately equal the weight of the hay crop that would normally have been got. Its value as a feeding-stuff will, however, be greater, for the residue from the protein-rich leaves that have been examined contains a minimum of 12 per cent. of crude protein, and this is well above the average for hay.

Problems to be Studied

If it is agreed that there is a *prima facie* case for the preparation of leaf protein, three separate problems remain to be investigated: the crops to be used, the machinery for maceration and the final treatment of the crude protein to make it palatable.

The first involves the selection of a crop, or a succession of crops, that will yield leaves of as high a protein content as possible during as many months of the year as possible. This is entirely an agricultural problem and most of the necessary information is already available.

The second is an engineering problem and there is little existing experience to go on, for the behaviour of laboratory mills throws little light on the probable behaviour of so intractable a material as minced leaves on the commercial scale.

There would appear to be no novel features in the third, dietetic, problem. Clearly, therefore, the second problem is the fundamental one, for the extraction of leaf protein on a commercial scale may prove more difficult than laboratory experiments suggest, and certain leaves, although suitable from an agricultural standpoint, may be too mucilaginous for convenient handling.

Future Developments

It is clear that there are many points at which difficulties may arise in the development of a process for leaf protein manufacture and that much work remains to be done before a definite statement on the feasibility of the project can be made. There is, however, no reason to think that these difficulties will prove insuperable, and it is contended that the necessary work should be begun now.

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Analysis of Sugar

In a report of Sub-Committee D on Recommendations of Referees of the Association of Official Agricultural Chemists it is recommended by W. C. Jones, J. W. Sale and J. A. McClerc, *Journal of the A.O.A.C.*, 1941, **24,** No. 1, p. 62: (1) That the collaborative work on the determination of unfermented reducing substances in molasses be repeated by next year's referee, that the Quisumbing-Thomas method be used for copper reduction, and that the copper in the precipitate be determined volumetrically. (2) That the procedure for the determination of diacetyl given in this year's report be subjected to collaborative study. (3) That study of drying, densimetric and refractometric methods be continued. (4) That studies on the determination of moisture in honey be continued, and that studies on honey-dew be inaugurated. (5) That work be done on sucrose and ash in molasses. (6) That the work on refractive indices of invert sugar solutions and the change in refractive indices with change of temperature in such products as invert sugar solutions, table syrups, etc., be continued.

Phosphates in Baking Powders

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WHILE the phosphate aerators have for many years been widely used in this country by commercial bakers and manufacturers of self-raising flour, they have hitherto been employed only to a somewhat limited extent in the preparation of ready mixed baking powders for household use.

With the present restrictions on supplies of tartrates, considerable interest has now been shown in the use of phosphates for the manufacture of such powders, and it is thought that it might be helpful to give a brief description of the available phosphate aerators, together with some guidance as to how they may be employed to the best advantage for this purpose.

Acid Sodium Pyrophosphate ($Na_2H_2P_2O_7$)

This is especially suitable for use as the acidic ingredient of a baking powder, since it is an excellent aerating agent and at the same time gives mixtures with bicarbonate of soda, which deteriorate in strength extremely slowly on storage.

The superior volume which it imparts to goods baked with it can mainly be attributed to its slow rate of solution. This means that very little of the available carbon dioxide is lost during the preparation and manipulation of a dough or batter, with the result that maximum aeration is obtained in the oven. Also the pyrophosphate appears to have a beneficial effect on the gluten of the flour, making it more extensible and rendering the dough more capable of retaining the carbon dioxide when it is evolved in the heat of the oven. For these reasons a pyrophosphate baking powder will usually give better volume than a similar quantity of a tartrate baking powder of the same available carbon dioxide content.

As regards " neutralising strength ", it may be taken that 1·36 lbs. of the undiluted grade of pyrophosphate at present obtainable will liberate all the carbon dioxide from 1 lb. of bicarbonate of soda.

In addition to the undiluted pyrophosphate, there are also obtainable the so-called " pyrophosphate cream powders ", which are popular with bakers and consist of pyrophosphate diluted with flour so that exactly 2 parts of the cream powder are required to react with 1 part of bicarbonate of soda. It should be mentioned that in general the diluent employed in the manufacture of such powders is undried.

Acid Calcium Phosphate ($CaH_4P_2O_8$)

This compound also serves as an acid aerator. Unfortunately, however, unless a relatively coarse granular form of this material is used, it gives mixtures with bicarbonate of soda which are so unstable as to preclude its use as the acidic ingredient of a baking powder unless special precautions are taken. It should be noted that these considerations do not apply to self-raising flour manufacture, where the high degree of dilution of the raising ingredients prevents premature reaction from taking place to any appreciable extent—provided the acid calcium phosphate and bicarbonate of soda are introduced separately into the flour.

The use of granular acid calcium phosphate in baking powder, though common in Canada and the U.S.A., has never been developed to any appreciable extent in England, and the reason for this may be that it has the disadvantage of producing black specks on the surface of the baked goods. Thus, the acid calcium phosphate available is exclusively a finely powdered grade which does not possess this disadvantage, but which, as mentioned above, gives mixtures with bicarbonate of soda which tend to deteriorate rapidly on storage. This difficulty may be overcome to a certain extent by the use of a dried " filler ", and in this way a satisfactory baking powder may be made with acid calcium phosphate provided a quick sale is assured. Even with a dried filler, however, it is not recommended that such a baking powder be stored for more than, say, two months before use.

Acid calcium phosphate, unlike acid sodium pyrophosphate, reacts rapidly with bicarbonate of soda in a cold dough, and in this respect it is comparable with tartaric acid. It tends to have a tightening effect on the gluten of the flour, and for this reason gives the best results when it is used in conjunction with soft cake flours. Frequently it is considered desirable to incorporate a small proportion of acid calcium phosphate in a pyrophosphate baking powder so as to give that degree of " liveliness " in the cold dough which may be considered necessary by housewives who have been accustomed to baking with tartrate powders. However, it has been found that not more than 5 to 7 per cent. of the calcium salt should be included in the mixing unless a dried filler is employed, otherwise the powder will deteriorate too rapidly.

Double-Acting Powders

Finely powdered acid calcium phosphate is often used in a similar manner in the U.S.A., particularly in the so-called " double-acting " powders, where it is used in conjunction with anhydrous sodium aluminium sulphate (S.A.S.). The latter is a very slowly soluble compound which does not react appreciably with bicarbonate of soda in the cold, although it does so quite rapidly at temperatures near the boiling point of water.

The usual commercial form of acid calcium phosphate sold for aerating purposes is the " 80 per cent. " grade, which has an acidity of not less than 80 per cent. calculated as the anhydrous salt ($CaH_4P_2O_8$), the remaining constituents being dicalcium phosphate ($CaHPO_4$) and water of crystallisation. 1·25 parts of this " 80 per cent. " acid calcium phosphate will neutralise 1 part of bicarbonate of soda.

A " 50 per cent. " grade may also be obtained which, in addition to dicalcium phosphate, frequently contains salt or flour as a diluent. Two parts of " 50 per cent. " acid calcium phosphate are required to neutralise 1 part of bicarbonate of soda.

Monosodium Orthophosphate (NaH_2PO_4)

This has also been used as an aerating agent, but, owing to its hygroscopic nature, it is not suitable for use as the acidic ingredient of a baking powder, although a small percentage may be incorporated in a pyrophosphate baking powder provided the filler is dried.

It resembles acid calcium phosphate in that it reacts very rapidly with bicarbonate of soda in a cold dough, and for this reason the degree of aeration obtained with it is usually inferior to that given by the more slowly reacting pyrophosphate.

Similar considerations apply to monopotassium orthophosphate (KH_2PO_4), although this substance, presumably because it is less soluble than the sodium salt, gives better results than the latter in the baking process. However, under wartime conditions it is not obtainable for aerating purposes owing to the scarcity of potash.

Strength of a Baking Powder

To denote the strength of a baking powder the terms " available carbon dioxide content " and " total carbon dioxide content " are usually employed.

The " available carbon dioxide " is the percentage of the weight of the powder which is evolved as CO_2 when it is treated with water; the " total carbon dioxide " is the corresponding percentage evolved when the powder is treated with an excess of acid (usually sulphuric or phosphoric).

In determining the available carbon dioxide content of a phosphate powder it is always necessary to *boil* with water so as to imitate baking conditions, since the reaction in cold water is far from complete. For further information on this subject reference should be made to a paper by Potter, Bagnall and Fleming, *J.S.C.I.*, 1939, Vol. 58, p. 127.

With a properly balanced baking powder the value for " available " CO_2 should be within 1 to 2 per cent. of that for " total ". The following values are usually regarded as the legal minima for baking powders in this country :

Available CO_2 content ...	6 per cent.
Total CO_2 content	8 ,,

Baking Powders with 12 Per Cent. CO_2

An average value for the total CO_2 content of a baking powder intended for domestic use is 12 per cent., and below are given suggested recipes for baking powders which are calculated to give this value :

	per cent.
(*a*) Acid sodium pyrophosphate (undiluted)	32·1
Bicarbonate of soda	22·9
Filler	45·0
(*b*) Acid sodium pyrophosphate (undiluted)	25·7
Acid calcium phosphate " 80 per cent. "	5·0
Bicarbonate of soda	22·9
Filler	46·4

The filler employed is normally cornflour, rice flour or wheat flour, and although if the above recipes are adopted it is not necessary to submit it to a special drying process, it is recommended that this be done whenever possible, owing to the increased stability which results. The bicarbonate of soda should be a fine grade, as the use of coarser grades, although assisting in maintaining stability, tends to produce dark-coloured spots or patches on the surface of baked goods. It should be emphasised that this consideration is particularly important where pyrophosphate powders are concerned.

A small percentage (usually ½ to 2 per cent.) of light magnesium carbonate is sometimes included in baking powders with the object of maintaining them in a free-flowing condition. Such an addition is often useful in powders based on tartaric acid, but it is unnecessary in pyrophosphate powders, as the latter do not show the same tendency to cake.

Association of Scientific Workers

At a recent meeting of the Association of Scientific Workers were discussed proposals for a Central Scientific and Technical Board. Working scientists and engineers considered a real need existed for a Central Board to link science to the central direction of the war. First, our scientific resources were not being used as efficiently as possible, instanced by duplication of work and the lack of consultation of technical staffs on technical questions affecting production; secondly, as scientific and technical considerations permeate every sphere, the availability of technical advice is essential to the War Cabinet.

New developments were the constant concern of the research and development establishments under the Supply Ministries, in industry and the Universities, and needed to be closely linked with production. All the functions of science and technology were divided up in the different Government departments and industry; yet all these functions were related, and all were affected by the main strategy of the war.

There is a need for a full-time body, in direct contact with the War Cabinet, and with powers to obtain all necessary information on the resources and problems in the scientific and technical field; with the authority to initiate programmes of work and to have direct access to working scientists and engineers. The Association's proposals for a Central Scientific and Technical Board included these functions and powers.

There existed an absurd and damaging distinction between academic institutes and commercial undertakings, many of which were doing first-rate research and were at present the only organisations capable of translating laboratory processes into large-scale production. Bodies such as the Medical Research Council and the Agricultural Research Council were doing excellent work in their own Institutes and also by subsidising research, but have never accepted responsibility for directing the national effort in the medical, veterinary and agricultural fields.

The day after the meeting reported above it was announced that three full-time scientific advisers had been appointed to the staff of the Ministry of Production. While these appointments are obviously welcomed as a step to link science with production, it is, in the opinion of the Association, not clear from the official announcement whether the scope of activities of the three advisers will be wide enough to answer the demand for a Central Scientific and Technical Board.

Chemistry and Physiology of the Vitamins

TO WRITE a book on the chemistry and physiology of the vitamins at the present stage of our knowledge of them is an extremely difficult undertaking. Organic chemists are working hard on syntheses, physiologists on the action of the vitamins on the animal body and pathologists on the effects of acute and subacute deficiency, both single and multiple, in human beings. Moreover, workers in many laboratories, finding their animals do not thrive on some simplified diet which they had considered adequate in all known food essentials, postulate the existence of still more vitamins which may in time prove to be indeed fresh vitamins or only additional amounts of one of the well-known ones. Dr. Rosenberg has completed his task* with a large measure of success. As he states in his preface, he was working in various laboratories when active research on the chemistry of the vitamins was being carried on, though he himself has contributed little beyond some steps in certain syntheses patented under U.S.A. or British law. His research of the literature must have been a colossal task, but he carried it out and wrote his book with an impartiality that leaves judgment and balancing of conflicting results to the reader, a method which has its advantages as well as the more obvious disadvantages.

After a review of the "Vitamins in General", each vitamin is treated separately, the whole in alphabetical order. A very short chronology of the most important results leading to the recognition and identification of the vitamin is given, and then its nomenclature, occurrence, isolation, properties, chemistry (including synthesis where possible), industrial methods of preparation, specificity, determination (physical, chemical and biological), its physiology in plants and micro-organisms, its physiology in the animal body, avitaminosis, hypovitaminosis with clinical test methods, hypervitaminosis where it may occur, and human and animal requirements.

Provitamins A and provitamins D and their conversion into the respective vitamins are treated nearly as fully as the vitamins themselves.

Other vitamins A (A_2 and A_3) and flavin-enzymes are discussed in their appropriate chapters. Inositol, para-amino-benzoic acid and non-identified vitamins [including B_3, B_4, B_5, B_7 (vitamin 1), B_8 (adenylic acid), B_c, B_p (anti-perosis vitamin), J, L_1 and L_2 (lactation vitamins), M, T, U, folic acid, growth factor for *Lactobacillus casei*, grass juice factor, mouse factor, anti-pernicious anæmia factor] are treated in separate chapters.

As an appendix, comes a chapter on the vitagens, which include essential fatty acids, amino-acids and carbohydrates, choline and related compounds and organic sulphur-containing compounds.

Patents for Preparation of Vitamins

A quite new feature occurring in this book is a list of the patents for preparation of vitamins or vitamin-rich substances which have been granted in the U.S.A., Britain, France, Germany, Austria, Australia, Belgium, Canada, Denmark, Japan, Norway, Russia, Sweden and Switzerland. A short abstract of the claim of each patent is given, together with the inventor's name and the assignment recorded at the date of issue. It is extremely interesting, and the numbers of patents granted, over 1,000 in all, is surprising. For example, since Steenbock's patent for the anti-rachitic activation of foods by ultra-violet irradiation taken out in 1924 in Great Britain, in 1928 in U.S.A. and in 1935 in France, 112 patents (each of them in one to five different countries) have been granted for the conversion of provitamins D to vitamin D, most of them by the process of ultra-violet irradiation, and yet Steenbock's patent was at first regarded as all-embracing.

The author index at the end of the book refers the reader to the page on which the full reference to the work quoted is printed as a footnote. The book contains no illustrations.

Vitamin History

Only someone who has lived and worked through the development of a scientific subject should attempt to write its history; otherwise unless an author makes an almost exhaustive study of his subject he will almost inevitably miss important points and unwittingly ascribe achievements to the wrong worker. For example, Rosenberg became interested in the subject of vitamins in the nineteen-thirties, and has ascribed the discovery of the growth-promoting power of vitamin D to H. von Euler. In fact, in 1919 Steenbock had obtained a growth-response in his vitamin A-deficient rats by giving them carotene, and suggested that the vitamin A of cod liver oil, obviously a nearly if not quite colourless substance, might be a leuco-form of carotene. Other workers thought that samples of carotene which produced this growth-response must contain some vitamin A as an impurity. Still other workers with supposedly purer samples obtained no response. And it was Steenbock who demonstrated the growth-promoting power of vitamin D, and showed that this factor must be given to rats, or be available to them from their own stores of it, before they can respond to vitamin A. Unfortunately, in some ways, Steenbock was too much engrossed with other work to revert to his carotene experiments, and it was von Euler (and, independently, Smedley MacLean and also Moore) who took up the subject again and obtained a growth-response to purified carotene in rats which were well supplied with Vitamin D, but it was not von Euler who showed that vitamin D was necessary for growth.

Mellanby's Work

It is greatly to be regretted that Mellanby's work, showing a connection between lack of vitamin A and degenerative changes in the spinal cord, is not even mentioned in this book. The importance of this experimental work in relation to convulsive ergotism and lathyrism cannot be over-estimated. Nor does Rosenberg refer to Mellanby's work in skeletal changes affecting the nervous system produced in young dogs by diets deficient in vitamin A. The overgrowths produced in

* *Chemistry and Physiology of the Vitamins.* H. R. Rosenberg, Sc.D. Pp. 674. $12.00.

the skull and vertebral column are related to degenerative changes in the brain and in cranial and peripheral nerves. Deformity of parts of the brain and increased pressure of the cerebro-spinal fluid were also observed. What may be involved in similar changes in the human brain is alarming to contemplate.

A minor correction that workers on the vaginal contents of rats would probably like to be made, is that the " smear " does not need staining at all. The cornified or keratinised cells are easily distinguishable by their shape and size; hence diagnosis can be made within a minute of taking the smear, and a second examination made at once if the first is not quite satisfactory.

Bourdillon's work on the preparation of calciferol (his name for the vitamin D formed in the irradiation of ergosterol) is referred to only in the sentence, " The presence of oxygenated materials makes it difficult to isolate crystalline vitamin D, but the actual yield is not essentially affected ", and in the statement that it can be separated from other products of irradiation by preparing its 3,5-dinitrobenzoate. This is scarcely justice to the classic work of Bourdillon and his co-workers on the isolation and characterisation of calciferol.

The work of M. Mellanby is only referred to in one sentence, " Deficiency of vitamin D is to a certain extent, but not altogether, responsible for the occurrence of dental caries ", and there is no report of the long controversy as to whether " toxamins " do or do not exist, nor to the solution offered by Mellanby and Harrison in 1938 that phytic acid, present in large amounts in oats and wholemeal flour, combines not only with the calcium in those foods but with calcium present in other foods eaten at the same time, making insoluble phytates which are excreted in the fæces. (This was confirmed for man by McCance and Widdowson about the time of publication of Rosenberg's book.)

Biological Standardisation

The biological standardisation of the vitamins might be regarded as outside the scope of this book, but about one page on the subject has been devoted to each vitamin. Although the author states in the preface that there is a very satisfactory book on the subject, it is evident that he has not read it nor grasped the principle on which all biological determinations should be based—viz., the *simultaneous* test of the substance under examination and of a standard of reference available to all workers throughout the world. He even says that " the rat-growth test involves the determinations of the minimum amount of the vitamin required for growth and maintenance ", which is not quite correct (growth and maintenance requiring very different amounts of vitamin) and certainly is obsolete, for it was devised at a very difficult time, before any International Standards of Reference were available and before it was realised how very different could be the amounts of a vitamin required by rats for growth (at any specified rate) or for maintenance, living in different laboratories and fed on different vitamin-free (or nearly free) diets, and even for rats living in the same laboratory at different times and receiving possibly not exactly the same diet at all times. The difficulty of the conversion factor for expressing the vitamin A value of an oil or concentrate, as determined spectrophotometrically in International Units, has been noted, but rather slurred over.

However, it is too much to expect one man to be a specialist in every branch of vitamin knowledge, and, in spite of some misunderstandings and some omissions of references to important contributions to knowledge, this may be declared a useful book. It is well printed and bound, and there are very few typographical errors.

KATHARINE H. COWARD.

War Gases and Foodstuffs

The effect of the announcement that at the moment the carrying of gas masks is not absolutely necessary has been a diminution of interest and apprehension on the part at least of the general public. Needless to say, there has been no suggestion that the menace of gas attacks has been removed, and a timely book* just published should be of interest not only to the medical and veterinary professions, analysts and sanitary inspectors, particularly those who are charged by their Local Authority with the duties of Gas Contamination Officer, but to members of the general public, among whom are those responsible for food stores in large warehouses, shops, or even homes.

As Sir Joseph Barcroft, in a foreword to the book, says: " It is for the public to ask: On what sort of place can we best store our foods in order to protect them against contamination by gas? If we have not storage room of the best type, what is the second best, and how should we apportion the foods between the two? In Dr. Wooldridge's book the enquiring public will find the principles by which these questions can be answered."

Where information has been given in full in other publications, the author does not overload his book with repetitive matter, as is evidenced in Chapter II on Some Properties of War Gases. He is content to give a summary of those of particular importance in considering the contamination of foodstuffs—*e.g.*, persistence, taste, smell, power of penetration into different materials such as water and fat, stability towards water and content of arsenic. He refers the reader to the less specialised literature on the subject.

The chapter on the protection of foodstuffs from gas includes a discussion on the protective value of materials used for packing foods, of particular interest to food manufacturers. Local protection includes that on the farm, in the market, in bulk stores and of food in transit.

Among other items, the principles of decontamination are discussed, as is the salvage of contaminated foodstuffs.

A clear account of the organisation of a contaminated-food service is given, and much useful data and advice to Gas Contamination Officers are included.

A chapter on the detection of gas in foodstuffs concludes the book.

Dr. Wooldridge does not waste words, nor does he bury essential facts under a mass of verbiage. His book, while covering essentials, is of handy size and easy to read by the non-technical reader, and should be available in warehouse, store, factory and home.

* *War Gases and Foodstuffs. Chemical Warfare and Food Supplies.* W. R. Wooldridge, Ph.D., M.Sc., M.R.C.V.S. Pp. 50+vi. Illustrated. 2s. 6d. net.

Dehydrated Foods

AT the conference held in July at the British Medical Association House, under the joint auspices of the Nutrition Society and the Food Group, Society of Chemical Industry, "Dehydration of Foods and the Effect on their Nutritional Value" was discussed.

Importance of Dehydrated Foods

At the morning session Sir E. V. Appleton, Secretary of the Department of Scientific and Industrial Research, who was in the chair, outlined the course of development of research on dehydration in this country. In 1937 a Food Defence Plans Department was formed which sought advice from the Department of Scientific and Industrial Research, whose Food Investigation Board was under the chairmanship of Sir Joseph Barcroft. It was the duty of the scientist not only to carry out research suggested by the Government, but also to anticipate future requirements as far as possible. The F.I.B. had long realised the importance of dehydrated foods. Since the normal supplies of food imported in peacetime included no less than 3 million tons of water annually, there was obviously great scope for economy in transport and storage space.

Dried foods had been in use in various crude forms from early times, but in commercial practice Sir William Hardy's famous dictum that you must be clear about the biology before you come to the engineering had not been applied. The investigations to be described were made with a view to the complete preservation of quality, palatability and nutritive value. The work had been organised by Mr. E. Barnard, and carried out under the scientific leadership of Dr. F. Kidd. With the kind permission of Sir E. Mellanby, Dr. Harris and his colleagues of the Dunn Nutritional Laboratory, Cambridge, had been responsible for seeing that the processes worked out did not impair the nutritive value of the dried products. Much help had also been afforded by numerous industrial concerns, and special thanks must be expressed to Dr. L. H. Lampitt, chairman of the Food Group. The meeting would hear how much progress had been made in the last few years. It would help us to do all in our power to enable Britain and her allies, and eventually the whole world, to get the best possible food supply.

Principles and Practice

The first paper on "The Principles and Practice of Food Dehydration" was given by Dr. F. Kidd, Superintendent of the Low Temperature Research Station, Cambridge. Until recently the quality of dried foodstuffs was poor, and they suffered by comparison with products preserved by canning and refrigeration. The latter process, incidentally, effects the removal of water from the tissues by freezing, and is the first step in the modern process of vacuum ice-drying, in which the water is evaporated off without thawing. Although the products of vacuum ice-drying are excellent, difficulties arose in finding adequate manufacturing plant in wartime. Moreover, no saving in space was effected. Efforts had therefore been concentrated in other directions, and a method based on three main principles had been evolved. (1) The foodstuff must be given a preliminary heat treatment, or "blanching", to inactivate the enzymes which cause deterioration of quality and nutritive value. Sulphite or other antioxidants should be used in the scalding water, and the presence of copper and other heavy metals avoided. (2) Drying must be done as rapidly as possible in a current of hot air, but the temperature must not be raised above a certain maximum. (3) During subsequent storage, oxidation must be avoided by the exclusion of air and water vapour. It was emphasised that no method could produce good quality dried food from poor quality fresh food.

By dehydration the weight of carrots could be reduced to one-twelfth and the volume to one-nineteenth, with a corresponding saving in the amount of tinplate necessary for canning. Not all foods could show the same saving, but a complete week's ration could be produced having a weight and volume one-quarter of the equivalent fresh food. A demonstration of the reconstitution of a small cube of dried cabbage to fill a large beaker of water was observed with keen interest.

Meat and Eggs

"Dehydrated Foods—(*a*) Meat and Eggs" was the subject of a paper by Drs. Ethel M. Cruickshank, J. G. Sharp and E. C. Bate-Smith. These products are possibly of more value as sources of protein and calories than of vitamins, and their palatability is of paramount importance. Experience proves, however, that conditions ensuring maximum palatability are also the best for nutritive value. The relative advantages of pan, horizontal rotary roller, cabinet, conveyor and spray driers in securing optimum conditions were outlined and diagrams distributed.

Meat is dried by dejointing, deboning and cooking in slices ¾ inch thick. It is then minced and put in a drier, the extractives from the preliminary cooking being restored by spraying the partially evaporated fluid on to the meat during drying. Rotary steam drying in vacuum works well provided the temperature does not rise too high. The biological value of the protein of a sample of meat dried at a temperature not exceeding 80° C. was equal to that of fresh cooked meat. Drying meat at 125° C. caused a 30 per cent. reduction in the growth-rate of rats in comparison with fresh cooked meat. Temperatures above 80° C. caused some destruction of vitamin B_1, and none survived in commercial rotary driers. Preliminary experiments indicated that riboflavin and nicotinic acid are more stable.

Eggs must be dried without excessive heating, since denaturation of the protein causes inferior binding power on reconstitution. Spray-drying gives good results if the temperature is kept under 75° C. Band-drying must be done at 45° to 50° C. In eggs which were spray-dried in experimental plant no loss of vitamins A and D occurred, but there was considerable loss in band-drying. Panels to test the palatability of dried eggs have been set up in various places, and closely concordant results are always obtained.

Dried Fish

" Dehydrated Foods—(*b*) Fish " was dealt with by Dr. G. A. Reay, of the Torry Research Station, Aberdeen. Although drying by wind and sun, with or without salt, had been practised for centuries, this was always accompanied by changes in taste and odour which were not always approved by the sophisticated palate. Modern methods, which have so far been applied to lean fish such as the cod and haddock, produce materials of quality equal to fresh, although the original form and texture is changed. Roller drying to a water content of 8 to 9 per cent. gives a product which had the appearance of lacework, and which is excellent for fish-cakes. Milling makes the material too pasty. Air-drying in a kipper kiln has also been tried.

The fish should be first minced, then cooked, minced again and finally dried at temperatures under 65° C. within a time limit of 4 hours. In most cases the material keeps well, but sometimes deteriorates within a few months, and further research on storage is necessary. Products representing one-eighth to one-tenth of the original volume and one-sixth to one-ninth of the weight have been obtained and are excellent for *au gratin* dishes, fish-pies, etc.

The Discussion

A discussion of the first three papers was opened by Dr. N. C. Wright, of New Zealand. He pointed out that investigations on the dehydration of food are going on in many parts of the world, making special mention of Vickery in Australia, and suggested that a full and immediate exchange of information is eminently desirable. He also urged a more rapid bridging of the gap between research and industry. Engineering firms should be prepared to take a chance in putting new processes into operation on a large scale.

Dr. Macfarlane agreed with Dr. Kidd that the method of vacuum ice-drying was not suitable for development during the war, but the products so obtained have advantages in ease of reconstitution and comparative stability to oxidation.

Dr. D. H. F. Clayson enquired as to the efficiency of fuel economy in various types of drying plants. Even in the most efficient apparatus possible 1 part of fuel would be necessary to evaporate 10 parts of water. Dr. Spooner mentioned that some drying apparatus is so efficient that only 1⅛ lb. of steam was necessary to evaporate 1 lb. of water. Information as to the lowest temperature at which bacteria can grow would be of great commercial interest. Would it be possible to use inert gases in place of air?

Dr. Colgate drew attention to the wide variations in the aerating powers of dried eggs, a property of great importance in the baking trade. No dried eggs could approach frozen eggs. Wheat gluten dried at low temperature in a high vacuum was much superior to gluten dried in a low vacuum at higher temperature.

In reply, Dr. Kidd considered that the use of inert gases was worth a trial. Dr. Bate-Smith explained that the cost of the fuel necessary to dry one pound of an article costing, say, 2s. 6d. per lb. is only about ¼d. Fuel is therefore a small item. The aerating powers of eggs can be increased by raising the temperature, and even bad dried eggs aerate well at 50° to 55° C.

During the luncheon interval members had an opportunity to sample dishes prepared from dehydrated foods. Minced meat, fish-cakes, mashed potatoes, cabbage and carrots were all excellent, with flavours typical of fresh foodstuffs of the highest quality.

In the unavoidable absence of Dr. Lampitt, the chair for the afternoon session was occupied by Mr. H. E. Cox, chairman of the Food Group.

Vegetable Dehydration

The first paper was by Drs. R. J. L. Allen, J. Barker and L. W. Mapson on " Dehydrated Foods—(*c*) Vegetables ". The investigation had covered the cabbage, carrot and potato. General *desiderata* in the dried product were preservation of colour and nutritive value and good keeping properties. In cabbage, ascorbic acid (vitamin C) is a most important nutrient. To prevent its loss by leaching, the preliminary blanching should be short and in a minimum of water. A better method is to scald successive batches of cabbage in the same water, thus tending to bring the soluble constituents in the leaves and water into equilibrium. To build up the scalding liquor before use, the discarded outer leaves of the cabbage may be scalded therein before the edible portions are introduced. The addition of sulphite preserves the ascorbic acid and also the colour, which tends to deteriorate in its absence. The following data on the ascorbic acid of cabbage dried in various ways were obtained :

Scalding Treatment.		*Per Cent. Ascorbic Acid retained in Scalded Cabbage.*	*Per Cent. Ascorbic Acid retained in Dried Cabbage.*
Water...		49	30
Sulphite		57	48
Steam and sulphite ...		84	63
Serial scald with sulphite	1	60	50
	3	80	63
	5	88	67
	8	95	77
Serial scald with sulphite in extract of outer leaves	1	89	75
	5	90	75
	8	90	80

If the dried cabbage is suitably cooked, the prepared vegetable may contain 35 per cent. of the original ascorbic acid. The dried material may be stored for 18 months in nitrogen or for 6 months in air.

With carrots the main nutrients to be preserved are carotene (provitamin A) and sugar. At least 90 per cent. of the carotene, which is insoluble in water, survives scalding. To minimise loss of sugar, the roots should be scalded whole. Dried carrots can be stored for 18 months in nitrogen, but deteriorate in air, although some samples are more stable than others.

Potatoes should be scalded in dilute sulphite to prevent darkening, and iron must be avoided. The success of processing depends somewhat on variety; thus the " King Edward " is preferable to " Majestic ". By employing a serial scald, 60 per cent. of the original ascorbic acid may be retained in the dried product. After reconstituting by soaking in water, followed by boiling, 35 per cent. survives.

Notable Achievements

Mr. V. L. S. Charley complimented the authors on their notable achievements. The new methods would be useful in allowing surpluses obtained at good periods of the year to be used in times of scarcity. He mentioned that 22,000 tons of dried vegetables were required for the American Army. He questioned what the attitude of the Ministry of Health would be towards the presence of sulphur dioxide in these products. The usual waste of 50 per cent. of cabbage or 20 per cent. of carrots in trimming was regrettable. The possibility of evaporating the scalding water with the vegetables during drying, as with meat, might be worth investigation.

Mr. T. Rendle suggested that it was impracticable to take risks in jumping at once from the laboratory to the full factory scale. Work on dried vegetables with pilot plant had been proceeding, and this stage was now nearly completed. Mr. McLellan recalled how much had been done on the engineering side in the sugar-beet industry. There was also a pressing need for a simple domestic drier to preserve surpluses from allotments. In reply, Dr. Allen agreed that there was 50 per cent. loss in the trimming of cabbages before drying, which was particularly regrettable in view of the nutritional superiority of the rejected outer leaves. The presence of sulphite in the scalding water might preclude its evaporation with the vegetables. Dr. Mapson pointed out that the basic principles for scalding should be applicable not only in drying, but also in canning and in the home. For example, the tops of carrots, rich in ascorbic acid, can be used to fortify the water in which the roots are subsequently to be boiled. The cooking of cabbage, our most important source of vitamin C, should be more carefully controlled. The chief nutritional advantage of the dried vegetable over the fresh is that in the dried there is no ascorbic oxidase; there is therefore no danger of loss of ascorbic acid from bruising or during the earlier stages of cooking. The dried cabbage, when reconstituted and cooked, loses its antiscorbutic potency, if kept hot after cooking, as rapidly as fresh cabbage, but owing to the ease with which the dried vegetable is cooked the necessity for using the hotplate in canteens may be eliminated. Much labour should be saved to the housewife by the use of dehydrated foods.

The final paper, by Sir Joseph Barcroft, discussed the "Utilisation of Dehydrated Foods". Although other speakers had emphasised the advantages of the new processes in facilitating storage, transport and cooking, to him the most important factor was quality. The new products would improve the general nutritive level of society. If this high quality can be maintained and standardised a great future is assured, and the time is ripe for the reorganisation of the whole industry. The new processes would be invaluable in avoiding wastage during periods of glut. It might be thought that unfair competition to fresh foods would be offered, but only the sale of fresh foods of poor quality, stale fish and stale milk, would suffer. The ease of cooking would recommend the new materials in canteens, and might even make them an important factor in "the reconstitution of the home"! Squadron-Leader Macrae said that dehydrated foods had been successfully introduced into the R.A.F., and commended them for their ease in cooking, preservation of nutritive value, and reduction of wastage through increased palatability. Dr. J. Hammond suggested that the new foodstuffs would affect, firstly, production; secondly, distribution; and, thirdly, consumption. Production would be affected, as others had mentioned, by the ability to deal with gluts. Easy transport would mean that large parts of the world suitable for food production, such as Rhodesia and Northern Australia, could be opened up, probably for the production of meat. The consumption of the foodstuffs would be increased on account of their low price, fine quality and ease of preparation. They should be invaluable in arranging post-war relief.

In closing the conference the Chairman dwelt on the immediate and urgent requirements for dried foods to assist in various phases of the national effort. Economic considerations must be considered as having only secondary importance. The Food Group was gratified to have had the opportunity, in collaboration with its younger brother, the Nutrition Society, to promote such a useful discussion. On behalf of the Food Group he thanked the Secretary, Mr. Bushill, for his part in organising the meeting.

Ministry of Food

(*Continued from page 282*)

Licensing of Wholesale Fish Dealers and Processors

In furtherance of the policy of requiring all traders in foodstuffs, whether as sellers or as manufacturers, to be licensed, the Minister of Food has made the Fish (Licensing of Dealers and Processors) Order, 1942, prohibiting, except under licence, the sale otherwise than by retail of any kind of fish, and the processing of fish in any manner specified in the Order. The Order takes effect on October 1 and supersedes earlier Orders requiring wholesale merchants, herring salesmen and curers, and smokers of wet salted fish to be licensed.

Existing licences to sell fish by wholesale otherwise than on a first-hand sale, or to sell herrings on a first landing, will cease to be valid after October 1. The holders of such licences and all other merchants, salesmen and commission agents selling fish otherwise than by retail will require to hold licences under the new Order. Producers need not hold licences unless they sell fish otherwise than through the agency of a licensed salesman.

Existing licences to cure herrings by pickling or to smoke wet salted fish will also become invalid, and the holders of such licences, and also other processors of fish, including manufacturers of fish-cakes, but not canners or packers of fish in jars for the retail trade or processors of fish otherwise than for human consumption, will require licences under the Order.

All holders of existing licences will, during the next few days, receive from the Ministry a form on which to make application for a new licence. There will, however, be in addition a considerable number of persons or firms not at present licensed who will require licences in future, as, for example, producers of fish who desire to sell otherwise than through the agency of licensed salesmen. Such applicants should apply for a form of application to the Director of Fish Supplies, Ministry of Food, Portman Court, Portman Square, W. 1.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, September 1, page 258.

No.	*Date.* 1942.	PRICE FIXATION ORDERS
873	May 7.	Amending the Meat Feeding Stuffs (Control and Maximum Prices) Order, 1941 .
874	,, 7.	General Licence under the Horseflesh (Control and Maximum Prices) Order, 1941. (1941 No. 1862.)
917	,, 13.	Amending the Nuts (Control and Maximum Prices) Order, 1942.
936	,, 18.	Processed Cheese (Control and Maximum Prices) Order.
947	,, 20.	Rice (Maximum Prices) Order, 1942. Revokes S.R. & O. 1941 Nos. 464 and 645, and 1942 Nos. 210 and 496.
949	,, 20.	Amending the Pickles and Sauces (Control and Maximum Prices) Order, 1942.
956	,, 21.	Salmon (Maximum Prices) Order.
978	,, 22.	Amending the Oat Products (Control and Maximum Prices) (No. 2) Order, 1941.
980	,, 23.	Amending the Soft Fruits (Maximum Prices) Order, 1941, and Prescribing an Appointed Day for the Purposes of the Gooseberries (Control of Picking) Order, 1942.
1014	,, 26.	Imported Canned Meat (Maximum Prices) Order. Revokes S.R. & O. 1941 Nos. 956, 1085 and 1396, and 1942 No. 338.
1015	,, 1.	Maximum Prices Direction (No. 1).
		CEREALS
946	May 20.	Pearl Barley (Control) Order.
977	,, 22.	Transport of Oatmeal, etc.
1276	July 1.	Rice (Control) (No. 2) Order. Revokes S.R. & O. 1942 Nos. 256, 652 and 824.
1391	,, 15.	Rye (Control of Mills and Products) Order.
		FEEDING STUFFS
1198	June 20.	Amending the Directions, May 1, 1942.
1122	,, 24.	Directions.
1485	July 28.	Directions under the Feeding Stuffs (Rationing) Order, 1942.
1501	,, 31.	Amending the Compound and Mixed Feeding Stuffs (Control) (No. 2) Order, 1940.
1502	,, 31.	Directions under the Compound and Mixed Feeding Stuffs (Control) (No. 2) Order, 1940.
		FLOUR
1123	June 10.	General Licence under the Flour (Restriction on Use) Order, 1942. (Ice cream.)
		FRUIT
1033	May 29.	Amending the Directions, April 4, 1942.
1074	June 3.	Fresh Fruit and Vegetables (Use of Containers) Order.
1105	,, 8.	Prescribing an Appointed Day for the purposes of Gooseberries (Control of Picking) Order, 1942, and giving directions thereunder. Directions now revoked by S.R. & O. 1942 No. 1138.
1162	,, 17.	Direction, Transport of Fresh Fruits.
1193	,, 19.	Directions.
		HONEY
1075	June 3.	Honey (Control).
		MEAT
1372	July 11.	Amending the Bacon (Addition of Borax) Order, 1940.
1473	,, 25.	Bacon (Rationing).
1476	,, 25.	Meat (Rationing).
		POINTS RATIONING
1088	June 4.	Directions under the Food (Points Rationing) Order, 1942. (Canned apples.)
1480	July 25.	Points Rationing (No. 2).
1481	,, 25.	Personal Points.
		TOMATOES
1054	June 1.	Home-Grown Tomatoes (Distribution).
1107	,, 8.	Home-Grown Tomatoes (Distribution) (No. 2).
		TRANSPORT
1371	July 11.	Directions. (Oatmeal.)
1399	,, 16.	Amending the Directions, May 11, 1942.
1534	,, 31.	Transport of Fresh Plums Direction.
		VEGETABLES
1164	June 17.	Amending the Potatoes (1941 Crop) (Control) (No. 2) Order, 1941, and Revoking the directions thereunder. Revokes the directions contained in S.R. & O. 1942 Nos. 204, 457 and 538.

Correspondence

The National Bread

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—It is always a pleasure to have an argument with Mr. Bacharach and to have the opportunity of augmenting his knowledge of the milling industry.

I did not reply to his question previously because it seemed so obvious, and I did not consider it to be serious.

I can put the matter in another light which may be more convincing to Mr. Bacharach. I agree that the public will probably not eat 100 lbs. of wholemeal against 70 lbs. of white. That is immaterial to my argument. If a miller had a demand for 70 lbs. of white flour, he had to buy 100 lbs. of wheat to get it, and sell his 30 lbs. offals for less than he paid for his wheat. If he now has a corresponding demand for 70 lbs. wholemeal, he has only got to buy 70 lbs. of wheat to produce it, and has not the bother of marketing and distributing his offals. His labour and power charges would be correspondingly reduced.

If, by any chance, he had bought 100 lbs. wheat, he only needs to grind 70 lbs. of it and resell his remaining 30 lbs. as wheat, *not* wholemeal. Mr. Bacharach states that animals cannot be fed on wholemeal (evidently he considers it only fit for the higher animals!), but surely he is forgetting the enormous quantity of whole wheat fed to poultry in normal times. I have come across many farmers who made a practice of grinding their own wheat to mix in with potato swill to feed pigs.

A comparison of the present prices of wheat and middlings will convince Mr. Bacharach that it is not a paying proposition to convert wheat at 72s. per 504 lbs. to middlings at £8 2s. 6d. per ton.

Yours faithfully,
THOMAS H. FAIRBROTHER.

17, LISKEARD GARDENS,
BLACKHEATH, S.E. 3.
September 4, 1942.

CORRECTION

In Mr. Bacharach's letter published in FOOD MANUFACTURE, September, p. 264, five lines from the end, the sentence " 120 lbs. of wholemeal flour " should have read " 100 lbs. of wholemeal flour ". This does not affect the foregoing reply.

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—The introduction of the National Bread has raised a storm amongst diverse sections of the population. The arguments for and against it have been so wildly contradictory, so fanciful and so biased that one wonders why this should be. The reason is, surely, that in spite of using bread as the basis of our diet for very many years, we still know very little about it. Chemical analyses, certainly, have been tabulated, but facts about its digestibility and assimilability are few. So we are left with our theories, our opinions and our prejudices.

It will clear the air if the important facts, as we know them, are written down.

First of all, from the point of view of chemical analysis, higher extraction breads contain more protein, mineral salts, vitamins and fibre, but less starch, than white bread.

Secondly, it has been shown that there is a smaller percentage of absorption of protein from the higher extraction meals, due almost certainly to the enclosure of some of the protein in cellulose envelopes of the bran. It is also definitely established that the protein of the higher extractions is of greater value in body building and repair than that of white flour; but as regards the value of the protein absorbed, the following calculation is interesting: White flour contains 12 per cent. of protein with a 91 per cent. digestibility; that is to say, 10·9 grams are absorbed from every 100 grams of flour. Eighty-five per cent. extraction meal contains 13 per cent. of protein with an 85·3 per cent. digestibility, and so we find that 11·1 grams are absorbed per 100 grams of meal. In other words, the total amount of protein absorbed from National Bread is fully as great as that absorbed from the equivalent amount of white bread; and the protein in the former case is of greater nutritive value.

We know that the absence or shortage of the B vitamins in the diet produce deficiency diseases, which are cured by giving vitamin B complex. It is well established, particularly by workers in the U.S.A., that diets which are low in vitamin B, content produce a state which might well be called neurasthenia. The more active the patient, the quicker are symptoms produced. We also know from recent surveys that most diets of people in this country contain less vitamin B than the standards suggested by Steibeling or the League of Nations. The higher the extraction of wheatmeal, the greater is the quantity of Vitamin B, and so in this respect it is obvious that the National Bread is of greater value than white bread.

And now we come to the question of mineral content, which has produced much argument in the last few months. We know that the higher extraction meals contain more Ca, Mg and Fe than white flour; the problem arises as to their availability. The higher extraction meals contain phytic acid, which precipitates Ca, Mg and Fe salts into insoluble forms. Some of this phytic acid is destroyed in bread-making, probably by enzymes of the yeast. We want to know how much Ca, Mg and Fe the phytic acid renders insoluble and in what proportions they are likely to be precipitated. Experiments have shown that phytic acid given to dogs can combine with Ca to make it unavailable, and that in man the absorption of Fe from high extraction bread is less than from white bread under certain conditions. The latter statement is a result of one small but carefully conducted experiment without clinical control. What arises definitely is that phytic acid is present in the higher extraction meals; its distribution between the various cations of Ca, Mg and Fe will be determined by the relative concentrations of the reacting substances and by the solubility of their products.

Here is the reason for adding calcium to National Flour. Chalk is the cheapest form and is acceptable

to the human stomach. That part which is precipitated by phytic acid is not absorbed. The remainder is there to be used if required. From the point of view of available calcium, the suggested addition of 7 ozs. of calcium carbonate to 280 lbs. of National Flour is the equivalent of giving ½ pint of milk with every 1 lb. of bread. The calcium is, however, provided as carbonate instead of phosphate. Precipitation of phytic acid by the calcium leaves the Fe for absorption.

Those who may be worried at the thought of taking extra calcium will get relief from the knowledge that some other healthy nations—*e.g.*, the Finns—consume considerably more calcium than we do, and that there is no medical evidence to suggest that this increase in calcium will be deleterious to health. Many people take a large amount of calcium in milk drinks and milk puddings and find it suits them.

The known facts thus suggest that National Bread is nutritionally better than white bread in protein and the vitamin B complex, but provides less mineral salts unless the meal is fortified, for example, by calcium.

Yours truly,
R. A. MURRAY SCOTT.

239, HARROGATE ROAD,
LEEDS, 7.

Food Nomenclature in Wartime

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—We have read the article by T. McLachlan, F.I.C., on "Food Nomenclature in Wartime" in the August 1 issue of FOOD MANUFACTURE.

As manufacturers of cocoa and chocolate, we would refer to that part of the article under the heading "What is a Substitute?" in which it is stated that "preparations of which the composition has changed completely since the outbreak of war" includes cocoas and chocolate. Cocoa is the powdered kernel of the cacao bean after processing and removal of surplus cocoa butter, with or without added flavour.

Proprietary cocoas made by well-known firms have not undergone any change in composition as a result of the war.

As regards chocolate, while the sugar content may in some cases have been reduced slightly, and milk powder used in place of fresh milk, it is substantially the same product as pre-war, and consists of the kernel of the cocoa bean, with sugar, added cocoa butter, and flavour.

It is certainly untrue to put cocoas and chocolate in a list of foods of which, to quote your contributor, "the composition has changed completely since the outbreak of war".

Yours truly,
(For J. S. Fry and Sons, Ltd.)
W. B. WALKER,
Chief Chemist.

Editorial Note.—We print below Mr. McLachlan's letter. In his article he was, of course, referring to the fact that he had found samples of the products mentioned which had been modified in composition, but the inference that this was general is quite incorrect, and was farthest from the author's mind. The mention of the actions of a few does not condemn a whole industry.

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—It has been suggested to me that the words "A very cursory glance at preparations of which the composition has changed completely since the outbreak of war shows us the following foods" are capable of implying that all products of the types mentioned are completely different. Such was not my intention, and I should probably have been more careful in the phraseology if the article had been written for the lay and not for the technical press.

I should have thought that the very fact that milk substitute powders were bracketed with sausages would have been sufficient to indicate what was in my mind, seeing that the one preparation was banned by the Ministry of Food, whilst the other was forced on the trade by the same Ministry.

Nor was it my intention to cast any slur on manufacturers generally or in particular. I do not think, Sir, that you would have published such an article had you thought this possible. My sole desire is that there should be some indication on every label where a change has been made from peacetime composition, to inform the public that such a change has in fact occurred, and so that there will be a greater incentive after the war is over to return to what, I am sure, all your readers believe to be the standard at which we aim.

Yours faithfully,
THOMAS McLACHLAN.

Ministry of Supply

THE Minister of Supply has made a new Order which will control the packing by manufacturers of a wide range of commodities.

The packing materials concerned include paper, glass, metals, fibres and plastics; and most commodities in general use, excluding foodstuffs, are also affected.

The purpose of the Order is to achieve considerable savings in material, labour, plant and transport at present employed in the manufacture of containers and to reduce the labour and transport required in the distribution and retail sale of pre-packed goods. It will also prevent the indiscriminate substitution of certain types of containers for those which are already controlled.

Restrictions are imposed on the printing and decoration of all the containers now to be controlled, and the result of this will be that two colours will normally be the maximum allowed.

While the Order does not impose restrictions on the quantity of any commodity which may be produced, it does limit the number of sizes in which commodities may be packed, in some instances reducing them to a single size.

The Order is the Control of Packaging (No. 1) Order, 1942, and refers to the British Standards Institution Schedule No. 1048, 1942. It came into operation on July 23, but there was no intention to prevent the continued use of containers in existence on July 23, 1942, provided they are containers of a type generally in common use for that purpose earlier than 1941.

News from the Industry

Saccharin

Article 2 of the Saccharin (Control and Maximum Prices) Order, 1941, was amended from August 31, 1942, so as to exempt from the licensing provisions of that Article the manufacture for sale of saccharin and dulcin solutions intended solely for use in pharmaceutical preparations.

* * *

Sugar for Cakes

The Ministry of Food announced, as from September 21, the reduction of the allowance of sugar which manufacturers obtain to enable them to manufacture cake and flour confectionery for works canteens and other priority establishments, from 26 lbs. to 20 lbs. of sugar per 100 lbs. of cake and flour confectionery. This reduction is being made as part of the measures for economising shipping space.

* * *

Mr. F. A. Secrett

The Minister of Agriculture has appointed Mr. F. A. Secrett to be honorary adviser on vegetable production.

* * *

Mr. G. H. Collinge

The Ministry of Food has appointed Mr. G. H. Collinge, of Southport, to be its retail meat trade adviser for England and Wales.

* * *

Milk for Caterers

The milk allowance to caterers is now nine pints for each hundred hot beverages served. Previously caterers were allowed to serve as much milk as they were able to get. Office tea clubs are not affected.

* * *

International Sugar Scheme

The International Sugar Agreement, which has been in operation for five years, expired at the end of August. Its extension for a further period has been proposed. It is reported that the Government of India may not participate in the new agreement.

Catering Wages

The Minister of Labour is to reconsider his plans for the establishment of a Central Wages Board for the catering industries. This move has been dictated by the opposition against Government regulation of wages and conditions. No details of the modified plan are available, but a meeting is to take place shortly between Mr. Bevin and representatives of the catering trades.

* * *

Condemned Food

Nearly 70 tons of food was condemned in Manchester Smithfield market in July as unfit for human consumption.

Food found to be unfit for sale included 31 tons of meat (22½ of which was diseased), 27¼ tons of fish, 4¾ tons of vegetables, ½ ton of fruit, including 352 lbs. of cherries, 919 head of poultry and game, 353 rabbits, 57 eggs, 698 lbs. of canned milk, 1,800 lbs. of canned meat, and 430 lbs. of miscellaneous items, including jam.

* * *

Emergency Food Supplies

The Ministry of Food has arranged for the continuance of the control and distribution of food supplies in the event of any part of the country being cut off as a result of enemy action. In towns where there is a Food Office, the Food Executive Officer will take charge. Special arrangements have been made in the case of smaller communities. There has been appointed in parishes or groups of parishes in all rural areas in the Midland Division a local resident known as the Voluntary Food Organiser, whose duty it will be to assume control of food supplies and distribution in the event of the community being cut off from all contact with the Food Executive Officer and Divisional Headquarters of the Ministry. These Voluntary Food Organisers are giving much time to the work of preparing for an emergency, and residents in areas concerned should be ready to assist them if called on to do so.

Control of Sales of Onions

As the appeal to growers of over two acres of onions to offer to contract their supplies to the Ministry of Food has produced insufficient offers, the Home Grown Onions (1942 Crop) (Control) Order, which comes into operation at once, has been made. It requires that except under licence no grower shall sell any dry bulb onions, or onions suitable for drying out, except to the Ministry. The Order does not apply to onions planted after July 31 last, or to onions grown by anyone with less than one quarter of an acre of onions, or to onions sold for planting or the production of seed where official certificates have been granted. The Order does not apply to the following English counties: Derby, Devon, Dorset, Durham, Cheshire, Cornwall, Cumberland, Hereford, Lancashire, Leicester, Northumberland, Northampton, Oxford, Shropshire, Somerset, Warwick, Westmorland, Wiltshire, and Yorkshire; or to Scotland, Wales, Northern Ireland, and Scilly.

* * *

Marketing Arrangements for Milk

The Minister of Food has made an Order—the Milk (Sales to Distributors) Order, 1942—prescribing the terms and conditions which will govern the sale of milk by the Ministry to distributors in England and Wales from October 1.

On this date the existing system whereby producers sell direct to distributors under the Milk Marketing Board's contract comes to an end, and is superseded by the new milk marketing scheme described in the Government's Memorandum on Milk Policy (Cmd. 6362).

Producers will sell their milk to the Board, who will sell it to the Ministry; the Ministry in turn will sell it to distributors, and it is the details of this last transaction that are dealt with in the new Order. A copy of the Order, with an explanatory memorandum, has been sent by the Ministry to every distributor in England and Wales who was buying milk on a Board contract.

A New Wheat Variety

The Kirton Agricultural Institute and the Demonstration Sub-Committee of the Holland War Agricultural Executive draw the attention of all farmers interested in the Little Joss variety to a new variety of wheat of similar type, which is to be seen on the Institute farm growing alongside Little Joss.

This new wheat, Steadfast, was raised at the Cambridge Plant Breeding Station to improve on Little Joss in yield and standing powers. Both these points emerge in the Kirton trial, and it is suggested that all those in this county area contemplating sowing Little Joss for next season's harvest should consider the possibilities of Steadfast. The Demonstration Sub-Committee expect to arrange for demonstration plots of Steadfast to be sown in all Little Joss areas of the county.

* * *

Pest Infestation of Produce

Another pamphlet in the series dealing with aspects of the problem of infestation of produce by insects, entitled *The Control of Insects Infesting Dried Fruit*, has been published by H.M. Stationery Office, price 6d. net. It first describes the kinds of insects which are most commonly found on dried fruit, and how and where to find them. The measures which should be taken to keep the warehouse clean and to rid it of a resident insect population are then outlined.

The greater part of the pamphlet explains in detail how the dried fruit itself can be cleaned by fumigation with a mixture of ethylene oxide and carbon dioxide in a cheap and easily erected fumigation chamber. This can be supplemented, when the fruit is in store, by the regular use of an insecticidal spray, which is specified.

* * *

Increasing Canadian Food Dehydration

Additions and alterations are under way at Bulmans, Ltd., Vernon, B.C., to increase the dehydrator capacity by about 50 per cent. These additions will make Bulmans, Ltd., one of the largest food dehydrating plants in Canada.

Palm Kernels for Margarine

The Colonial Office has assumed control of the purchasing and shipment of palm kernels, from which the principal ingredient of margarine is extracted.

This decision has been arrived at in agreement with the Ministry of Food, which hitherto has been responsible.

Simultaneously it has been decided to raise the price paid to the native gatherers. This will result in increased supplies reaching this country from the West African territories. At present the annual production from Gambia, Sierra Leone, the Gold Coast and Nigeria is about 500,000 tons.

* * *

Institution of Chemical Engineers

The Institution of Chemical Engineers announces that the following candidates were successful in the Associate-Membership Examination for 1942:

George Henry Challis, John Alfred Ealey, John Edward Gregory, Victor George Jenner, Desmond Christopher Mandeville, Graham Holmes Preston, John Henry Sharp, Frederick John Wilkins.

On the result of the Examination, it has been decided to make two awards of the William Macnab Medal, the recipients being Mr. J. H. Sharp and Mr. F. J. Wilkins.

* * *

Dogfish Oil in Canada

A U.S. report says processors of dogfish oil in British Columbia have been ordered by the Canadian Wartime Prices and Trade Board to supply their product to the British Ministry of Food at the following prices:

Quality.	*Price per 1,000,000 British International Units.*
Vitamin-potency range 5,000 to 7,999	$0·11
Vitamin-potency range 8,000 to 14,999 ..	0·12
Vitamin-potency range 15,000 to 24,999 ..	0·13
Vitamin-potency range 25,000 to 40,000 ..	0·13

Rhodesia's Canning Trade

The Liebig canning factory in Southern Rhodesia, under the direction of the Department of Supplies, is capable of turning out 12,000,000 tins of canned products a year, which are being consumed locally. Because of a shortage of cattle the factory has only been running at half-power, but the matter is being looked into, writes *South Africa*.

* * *

Food Prosecutions in July, 1942

During July, 1942, there were 3,205 prosecutions under the Food Control Orders, of which 2,881 were successful. The prosecutions were taken against wholesalers, retailers, members of the public and other offenders against food regulations.

Convictions were secured against 47 wholesalers, 608 retailers and 775 other offenders. This represents a conviction percentage of 0·235 per wholesale licensee and 0·101 per retail licensee.

Details are also available of the number of prosecutions undertaken during July for specified groups of offences:

Type of Offence.	Prosecutions.	Successful Prosecutions.
Offences against maximum prices Orders	802	735
Imposing conditions of sale	36	30
Failure to display price	96	94
Illegal slaughter and allied offences ..	114	102
Supplying or obtaining foodstuffs without correct authority	1,039	966
False declaration ..	247	225
Trading without licence	127	110
Other offences ..	744	619
Total — United Kingdom ..	3,205	2,881

The following figures indicate the general incidence of penalties. Out of 2,881 successful cases 184 were dismissed under the Probation of Offenders Act. Fines of £1 and under were inflicted in 1,010 cases; fines above £1 and up to £5 in 953 cases; fines above £5 and up to £10 in 235 cases; and fines above £10 and up to £20 in 118 cases. In 260 cases the fines exceeded £20, and in 121 cases sentences of imprisonment were imposed.

Handling Bulk Materials

The Parker Portable Loader has been designed for loading all kinds of bulk materials into railway wagons and road vehicles. It is conveniently moved into any position required, being specially balanced on its running wheels for easy portability. There are several models of the portable type having belt widths from 14 to 24 inches with fixed or adjustable discharge heights from 9 ft. 6 ins. to 24 ft. The smallest machine is easily capable of dealing with 40 to 50 cubic yards of material per hour, and in actual use it has been found that, when fed by one man, it has a handling capacity equal to five men working with ordinary shovels.

The power unit is conveniently situated where it does not disturb the balance of the loader when being towed, and is easily accessible, though enclosed in a steel housing. The large diameter wrought-iron wheels add to easy portability, and the drives are well guarded. The belt can be cleated to provide positive travel and prevent material from rolling back. The loading hopper is mounted conveniently low for ease and speed of operation, and the whole machine, besides being designed for labour-saving operation and maintenance, is built to withstand long and hard usage.

There are optional variations in equipment available for most of the standard models — for instance, a castor wheel for ease of handling on rough ground, and swivelling wheels which enable the conveyor to move radially with the feed point as a pivot. An alternative type of loader is the BL series in which the conveyor can be made any length by means of coupling up 8 ft. sections up to a maximum of 60 ft. between the centres of the belt drums.

In addition to the variable equipment for their standard models, the manufacturers are prepared to submit designs to suit any special requirements, either for home or overseas, where many of these loaders are already in use. In addition to their range of portable loaders, they make fixed type conveyors, and any of their machines can, if required, be fitted with electric instead of petrol motors. Parker Loaders are made by Messrs. Frederick Parker, Ltd.

* * *

Maintenance of Plant

In view of the difficulty and in some cases of the impossibility of obtaining spare parts, it is essential that machinery nowadays be periodically inspected and overhauled, to prevent its partial or complete breakdown.

Factory Enterprises, Ltd., consulting and general engineers, have started a new department especially for the maintenance, repairs and overhauls of machinery of the food industry.

Should the machines be of Continental or American make, the right expert is available to give practical advice or make speedy repairs.

* * *

Change of Address

The Pascall Engineering Co., Ltd.

Address for postal deliveries: Monitor Works, 114, Lisson Grove, Marylebone, London, N.W. 1.

Address for goods deliveries: 48, Broadley Terrace, Marylebone, London, N.W. 1. Telephones: Paddington 7236 and 7237 (Private Branch Exchange). Telegrams: Pasenco, Phone, London.

* * *

Truck supplied to the Great Western Railway Company.

Electric Trucks

The efficient and economical handling of goods and materials is a vital factor in every industrial organisation to-day, when the necessity for saving time and man-power goes hand in hand with the need for speeding up production.

In this connection Ransomes' Electric Trucks are being used more and more by concerns of all kinds—factories, mills, warehouses, depots, stations and docks all over the country. Advantages which these trucks offer include exceptionally low running and maintenance costs, long life, simplicity, clean and silent running and independence of petrol or other imported fuel. The trucks are so cheap to run that they often pay for themselves in a few months, while an unskilled person, man, woman, boy or girl, can learn to drive them in a few minutes. Moreover, the work is done in perfect cleanliness, without fumes of any kind. Where conditions are suitable, Ransomes' trucks with elevating platform will do three or four times the work of a truck with fixed platform. The elevating truck is used in conjunction with stillages, placed at certain fixed points, and loaded in readiness to be picked up. The driver runs the truck platform underneath the stillage, elevates the platform by means of a switch, and the stillage is picked up in a few seconds. In this way the truck is kept in constant running service, and no time is wasted in loading and unloading.

In Ransomes' latest catalogue, just published, a large variety of trucks is shown. The standard 2-ton models can be supplied with fixed or elevating platform, long or short, high or low, wide or narrow, and there are trucks fitted with end or side tipping hoppers or with jib crane, tiering trucks and stackers for delivering or receiving loads at varying heights, as well as a truck of larger capacity for loads up to 4 tons. There is also an entirely new series of smaller capacity trucks, fixed or elevating, for loads up to 1 ton.

A New Paint

During the present time, when decorative materials are in short supply, it is interesting to learn of a new paint being marketed, available in unlimited quantities, which is particularly suitable for walls of food factories where hygiene and cleanliness are of paramount importance.

This paint, sold under the name "Snowcem", is made with a base of white cement and is supplied by the Cement Marketing Co., Ltd. It can be applied direct to brick or concrete and sets with a rock-hard water-repellent surface which can be cleaned repeatedly without deteriorating or staining.

Hitherto the treatment of brick or concrete has presented difficulties, since, owing to the alkalies and moisture present in these materials, ordinary paints and distempers quickly soften and flake off and constant attention is necessary.

The paint is officially approved for use under the Factories Act, 1937, Section 1 (c) 1, which means that it has, virtually, an indefinite life and no further treatment is necessary other than a wash-down at intervals of fourteen months.

Thus, in addition to meeting immediate needs as far as supply is concerned, it also solves the future difficulty of providing labour for maintenance.

* * *

Electrical Plus Water Power

With the development of electricity and the subsequent introduction of bulk electric supply, the power available from small rivers and streams has unfortunately either been ignored or overlooked, mainly because the ever-increasing use of machinery had in most cases rendered the available water power inadequate.

In rural districts a water-wheel is often left unused or arranged for driving only a section of the mill or factory. In some cases, earlier modernisation of the mill or factory has replaced the old water-wheel by powerful water turbines built underground, with the water disappearing down a concrete hole. Here again, in many cases, full advantage is not being taken of the water power available.

Actually it is not only possible, but in most cases simple, to absorb the *full* output of such a turbine or wheel through the medium of a Crompton Induction Alternator. The alternator can be regarded as an induction motor with the rotor driven at about 6 per cent. above synchronous speed, and the stator coupled to the three-phase bulk supply mains through a circuit breaker.

The machine has the further advantage that it will adapt itself to overspeed conditions occurring with an ungoverned turbine driven when disconnected from the bulk electric supply. In its parallel operation with the supply it is self-regulated and its output is governed by the speed of the prime mover by which it is driven.

Moreover, by connecting a suitable condenser and providing saturation, machines of this type become self-exciting and will continue to generate even if the bulk supply fails. It is advisable for a condenser to be used with an induction alternator in order to compensate for its lagging power factor.

It frequently happens that the period of low-water head coincides with the time of year at which the supply authorities reduce their maximum demand charges, so that the assistance from such a unit comes during the winter period when maximum demand are at their highest.

Many such installations have been planned and supplied in recent years by Crompton Parkinson, Ltd., and an almost infinite variety of similar arrangements can be used with advantage to meet present-day wartime individual cases.

* * *

Electrode Boilers

Electrode boilers are in use in every industry, but they have particular advantage in food manufacture, as there is no possibility of dirt, dust or fumes which might contaminate the food products.

The illustration shows an interesting case, as the electrode boiler not only serves three purposes—*i.e.*, heating building with steam radiators, boiling food in steam-jacketed pans, and supplying hot water to the building—but it is automatically started by a time switch, so that the building can be warmed, water heated, and the vats warmed up, before the workpeople arrive.

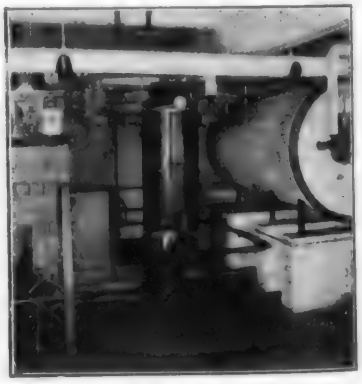
In the illustration, the hot-water tank can be seen on the right, the boiler in the centre, and the feed tank and control switch on the left. As the boiler takes up such a small space, and gives off very little heat, the remainder of the boiler-room is used for storing materials.

This particular boiler is rated at 350 kw., giving about a 1.000 lbs. of steam per hour, and yet the boiler stands only 6 ft. 6 ins. in height by about 2 ft. 6 ins. diameter.

This equipment has been in use for about ten years, and the costs of spare parts or replacements has been practically nil.

Very interesting applications have been made for canning, jam making, mineral water manufacture, brewing and catering, and in most areas electricity is available at rates which justify the use of electrode boilers, when the absence of labour for stoking, etc., is taken into account. In several cases, these boilers are operated entirely by women, and steam is available at full pressure within 3 to 4 minutes from switching on.

After that, the controls automatically look after the boiler, so that it maintains the required pressure with the minimum use of electricity. The makers are Bastian and Allen, Ltd.



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Emulsifying, Thickening and Stabilising Agent

Promulsin is an up-to-date emulsifying, thickening and stabilising agent having a wide application in food products. It can be described as a polyose derivative which is soluble in water

giving colloidal gels similar to those of methyl cellulose, but of higher viscosity. These gels are water-white, tasteless, odourless, and are free from undissolved suspended particles. They are particularly stable and are not easily attacked by bacterial organisms. The gels are so viscous in low concentration that a 2-3 per cent. solution in water can be poured only with difficulty. They are therefore especially valuable for giving "body" to food products. The product is an excellent emulsifier for both water-in-oil and oil-in-water emulsions which are extremely stable. Its action as an emulsifying agent is increased by a probable adsorption on to the oil surfaces, and therefore the interfacial tensions in oil-in-water emulsions prepared from it are much greater than their theoretical value. In this way very stable mixtures of high viscosity are obtained which prevent separation or creaming of the emulsion. It is free from all noxious substances and is absolutely non-toxic.

Among the many applications of Promulsin in the food industries are the following:

As an emulsifying agent in creams, mayonnaises, flavouring essences, etc.; as a thickener in cordials, sauces, chutneys, pie and pastry fillings, meringue powders, purées, ice cream mixes, etc.; as a stabiliser in jellies, table-creams, blancmanges, etc. It is available in powder, flake and liquid forms. The Watford Chemical Co., Ltd., are the manufacturers.

* * *

Powdered Egg Plant

An egg-powdering plant, with a capacity of 210,000 eggs a day, is being constructed by Burns and Co., Ltd., on their East Calgary industrial site, and will be operated under Dominion Government supervision. It is expected about 80 people will be employed when production commences the middle of July. The plant, first in Southern Alberta, will be installed in the company's old creamery and will cost approximately $46,000, of which $40,000 will be for machinery and $6,000 for structural alterations. The new plant will make available for use in Britain hundreds of thousands of Alberta eggs that could not be sent otherwise.

OBITER DICTA

● Do not serve butter or jam on to your plate; spread it directly on your bread.—*Lord Woolton.*

● The functioning of riboflavin is indispensable to good health, but very little is known about it.—*Dr. R. C. Newton, Vice-President in charge of research for Swift and Co.*

● There will be no muffins, unless they are made of the sawdust called wartime flour.—*Nathaniel Gubbins in the "Sunday Express."*

● "Paprika Speck" is a product quite different from bacon, and is known the whole world over, except in England.—*Witness in a recent prosecution.*

● Surfeit has killed more than famine. — *Theognis. Flourished about* 549 B.C.

● I blame the slimming craze for the fall in the consumption of potatoes. I have come to the rescue of the feminine figure. You cannot get fat on your diet now.—*Lord Woolton, speaking at Hull.*

● At that moment it was announced through the loud-speaker that the meeting was private. So I left.—*"Evening Standard" reporter, referring to a joint meeting, dealing with dehydration, of the Nutrition Society and the Food Group.*

● It is a pleasant fact that thought depends entirely on the stomach, and that in spite of that the best stomachs are not the best thinkers. — *Voltaire, August* 20, 1770.

● Do we still mouth the ancient shibboleths of capital and labour and think in terms of pre-war policies? Time enough for that when the war is won, or perhaps no time for it ever again. — *Sir Ronald Matthews, J.P., in an address to the Associated Chambers of Commerce.*

● Because the tastes of all tinned, canned, and bottled foods are very insipid, they all tend to taste very much alike. Hence the array of sauces with which our tables have been garnished in order that taste may be given to our tasteless food.—*Professor Joad in an interview with the "Sunday Dispatch".*

OBITUARY

Mr. Stephen Kunzer

We regret to announce the death, after a long illness, of Mr. Stephen Kunzer, the elder son of Mr. Henry Kunzer, Managing Director of Fredk. Boehm, Ltd.

Mr. Stephen Kunzer was at one time a director of the company, and his loss will be felt by all associated with him.

* * *

Mr. R. S. Forsyth

Mr. Robert Sutherland Forsyth, C.M.G., who died on August 21, 1942, was designated as Director of Imported Meat Supplies in March, 1939, and was very fully engaged during the summer of 1939 in the preparation of the Defence Plans on which meat control was put into operation soon after the outbreak of war. He took up his definite appointment with the Ministry of Food immediately on the outbreak of war.

His intimate knowledge of the imported meat trade, gained first of all in New Zealand, and later as London representative since 1923 of the New Zealand Meat Board, was of immense value in the foundation work in the Food Defence Plans Department, and the additional experience he had gained as a member of the Empire Marketing Board (later the Imperial Economic Committee) and also as a member of the International Beef Conference and of the Empire Meat Council, proved of the greatest assistance both then and under actual control conditions.

* * *

New Food Factory

Pre-war manufacturers with a national distributing organisation, Sunmill Food Products, Ltd., are opening a new modern factory in Vestry Street, City Road, London, in October.

The main products to be handled in the new factory are:

Self-Raising Flour, Cake Flour, Sponge Mixture, Steamed or Boiled Puddings, Baking Powder, Yorkshire and Pancake Mixtures, Semolina, and a number of other varieties.

The company is run on modern lines with adequate scientific control.

COMPANIES

Batchelor's Peas

The Sixth Annual General Meeting of Batchelor's Peas, Ltd., was held at Sheffield on September 7.

Mrs. E. H. Gasking (the chairman) said that the profit for the year amounted to £187,373, to which must be added £28,418 brought in, making a total of £215,791. From this there fell to be deducted Preference dividends, absorbing, with income-tax, £14,266, provision for taxation £135,000 and the transfer to capital redemption reserve of £5,869, leaving an available balance of £60,656. The directors recommended a dividend of 15 per cent. on the Ordinary shares, leaving £30,656 to be carried forward.

The plant and machinery had been maintained in an efficient state and adequate provision had been made for depreciation.

On the commencement of the fourth year of the war there was a greater intensity of effort in this country than there had ever been so far. It was now realised that labour and production must be confined to essentials in the war frame of reference. The application of this policy had had very serious consequences on the range of goods formerly canned, and the board's problem had been to redirect production so that they could contribute something of real value to the nation at war, and at the same time maintain the soundness of the company's financial structure. The successful handling of this problem had enabled them to present a balance-sheet showing an increase in profit.

They knew the truth of the Ministry's slogan, "Food is a munition of war", and the company's contribution to the war effort was to do all they could to "preserve" the right munitions and to have them ready to hand at the right time.

The report was unanimously adopted.

* * *

London and Provincial Bakeries

At the Fifth Annual General Meeting of London and Provincial Bakeries Limited, Mr. W. H. Curtis, the chairman, said that two years ago he had to report an adverse balance of £5,000, but in spite of that unfortunate position he ventured to predict that provided they had no setbacks they could look forward to a brighter future. Those remarks probably sounded rather optimistic, but he was convinced that under the guidance of the board of directors whatever was necessary to put the business on a sound foundation would be done. After two years the prediction had been more than justified.

The past year had been an extremely arduous one, with new regulations issued by the authorities almost a daily occurrence, and they made it a practice to conform to those regulations as much in the spirit as in the letter, realising they were intended for the common good.

The directors were pleased to report a satisfactory increase in turnover and also a considerable increase in trading profit, due to a large extent to efficient and capable management. The balance to profit and loss appropriation account was £33,341, as against £10,536, and taxation reserve for income-tax and excess profits tax took the very considerable sum of £20,500.

It had been a very great satisfaction to the directors to wipe off all arrears of dividend on the Preference shares. The maiden dividend on the Ordinary shares of 5 per cent. would take £1,831, leaving £3,379 to be carried forward, as against £2,793 brought forward. He thought on those figures they ought to congratulate themselves that the results had been so satisfactory. Six months of the current year had already passed, and the directors were satisfied with the results which had so far been achieved.

The report was unanimously adopted.

* * *

Union Cold Storage

At the Annual General Meeting of Union Cold Storage Co., Ltd., Sir E. H. Vestey said that out of the available balance of £300,145 the board recommended a dividend of 5 per cent. net on the Ordinary stock. This was the fortieth consecutive year in which the company had paid this rate. Regarding the current year, the results to date were satisfactory.

Dehydrated Meat Factory

A factory is being built at Wellington, New Zealand, to produce dehydrated meat for Britain.

* * *

Indore Method of Composting

At the National Food Production Exhibition in Birmingham Sir Albert Howard described "the Indore composting system". This method, he said, has the merit that not only is it truly economical in that waste materials are salvaged, but also that weed seeds and harmful insects and fungi are destroyed and that vegetables grown with its use are disease-resisting and of unequalled food value. The requirements are "organic wastes"—that is, plant residues; animal manure, earth, water and air. The compost heap so prepared should be ready for application in about three months.

* * *

U.S. Soya Bean Crop

The spectacular advance in the production of the soya bean in the United States has been an outstanding feature of the American oilseeds trade, and the States is now entirely independent of supplies from overseas, a great disappointment to Japan, which produced the bean in large quantities, and before the war considered America as its chief exporting source.

The foresight in recognising soya beans as a valuable crop will help the United Nations considerably in its supplies of vegetable oil. In 1924 the States only planted about 1¾ million acreage, from which were produced 4,947,000 bushels of beans, valued at $12,162,000; in 1940 the acreage had expanded to 11¾ million and production had leaped to 79,837,000 bushels, with a value of $60,535,000, while for the current season it is estimated that 195,000,000 bushels will be harvested for beans only, apart from other uses. This supply will help in replacing some of the oilseeds lost through enemy occupation in the Pacific.

Some beans have been sent to Britain under Lease-Lend terms and have been on sale in retail shops, but because of the lack of advice how they should be used housewives have not realised their value.—*The Financial Times.*

Information and Advice

Cereal Breakfast Foods

8,027. *We have the plant for making wheat flakes for breakfast food, and we are anxious to know the usual formula for making this.*

We are wondering if you could give us any information on the subject, for which we should be grateful. (Staffs.)

"The grain to be used must be selected entirely on its merits as a grain suitable for puffing. In the case of wheat, out of all the known wheats only about 1 to 2 per cent. are at all suitable for puffing. The grain must be free from all extraneous matter and be dried down to about 10 per cent. moisture. The actual puffing operation is carried out in a specially designed oven, preferably electrically heated. The whole secret of successful expansion of the grain lies in the design of this oven, which is constructed in such a way as to permit the instantaneous release of very high pressures. Apart from this, the processing of the grain is simply confined to cooking at pre-determined pressures." We suggest that you consult an expert on the subject.

Brined Cauliflower

8,136. *Method of putting down cauliflower in brine.* (London.)

There are many methods, but the following may be tried:

The cauliflower is held in a 60-degree brine or stronger until it becomes crisp and cured. It may be placed in barrels and salted at the rate of 5 lbs. per 100 lbs. of cauliflower; after remaining several days in this weak brine, it is rebrined at the rate of 8 lbs. per 100 lbs. of cauliflower and gradually increased until it tests 60 degrees. The first salting leaches out some of the sugar and objectionable matter (vegetable), and it helps to produce a whiter and crisper product. To produce 250 lbs. of cut cauliflower it will require 320 lbs. of cauliflower heads.

Information Supplied

8,127. *Manufacture of cider presses.* (Northumberland.)

8,129. *Preservatives in fish-cakes.* (Lancs.)

8,131. *Plant for manufacture of macaroni.* (Scotland.)

8,143. *Manufacture of breakfast cereals.* (London.)

8,147. *Air conditioning and drying.* (Kent.)

8,149. *Mandioca flour for custard powders.* (Eire.)

8,150. *Plant for manufacture of macaroni.* (Yorks.)

8,151. *Electrically operating machinery for the manufacture of vermicelli.* (Northumberland.)

8,156. *Tests for self-raising flour.* (London.)

8,159. *Market for sulphur burning plant.* (Yorks.)

8,160. *Curing and smoking of salmon.* (Eire.)

8,161. *Suppliers of paper capsules.* (Warwickshire.)

8,162. *Availability of machinery for grinding and mixing of food products.* (London.)

8,167. *Preserving asparagus on small scale.* (Northumberland.)

8,171. *Preserving horse radish.* (Hereford.)

8,174. *Manufacturers of plant for potato crisp making.* (Eire.)

8,175. *Suppliers of lipase.* (Essex.)

8,178. *Suppliers of casein, and publications on the subject.* (Berks.)

8,183. *Colours for food products.* (Yorks.)

8,184. *Manufacture of starch and potato flour.* (Eire.)

8,185. *Method of making blackcurrant syrup from blackcurrants.* (Middlesex.)

8,191. *Machines suitable for slicing dates to approximately $\frac{3}{8}$ inch thick, or, alternatively, producing $\frac{1}{4}$-inch fleshy cubes, the dates, if possible, to be handled in a pressed slab form direct from packing-case.* (Staffs.)

8,192. *Plants for boiled sweets. Also wrapping machines.* (N. Ireland.)

8,199. *Manufacturers of oatmeal puddings.* (Wales.)

8,202. *Phosphoric acid and phospho-citric acid in the manufacture of mineral waters.* (London.)

8,208. *Suppliers of moulds and hand tools for sweet-making, also small gas steam-heated boiling pans.* (N. Ireland.)

8,210. *Second-hand pea podder wanted.* (London.)

8,216. *Formula for the manufacture of rennet.* (Eire.)

8,217. *Colour pastes for confectionery, and essence pastes for the mineral water trade. Also presses for soft fruits.* (Eire.)

8,218. *Manufacture and processing of dehydrated vegetables.* (Suffolk.)

8,220. *Manufacture of rennet extract from calves' stomachs.* (Canada.)

8,226. *Calcium phosphate in aeration of flour confectionery.* (Durham.)

8,229. *Manufacturers of homogenisers.* (Lancs.)

8,231. *Gelatine from bones.* (Yorks.)

8,232. *Spray drying of milk albumen paste, also preservatives in food.* (Surrey.)

8,233. *Manufacturers of potato peelers.* (Glos.)

8,236. *Manufacturers of onion flavouring.* (London.)

8,238. *Manufacturers of sodium glutamate.* (London.)

8,240. *Equipment for perfect amalgamation of gummy liquid with powdery materials, not an emulsifier.* (Derbyshire.)

8,242. *Articles on dehydration. Also literature dealing with vitamin analysis.* (London.)

8,244. *Processing and analysis of soya beans.* (Cheshire.)

Information Required

8,324. *When using paper bags for packing milk powder, the opening of the bags is a problem. Required, a device or machine for opening them.* (London.)

8,301. *Packers of ridge cucumbers in brine in casks.* (Scotland.)

8,450. *Suppliers of "Unemul".* (London.)

8,356. *Names of those interested in supplies of washed damson stones removed when pulping whole fruit.* (N. Ireland.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements in Solutions for the Preservation of Meat

The present invention refers to a solution for the purpose of preserving meat used as food, through the medium of which process one obtains an excellent product for consumption which we may call semi-raw, as by this formula one is able to combat micro-organisms and at the same time offer a food free from the unfavourable characteristics shown by meat preserved by processes and methods so far known.

It is common knowledge that the ingredients employed and the methods used in the preservation of meat for the purpose of preventing decomposition have produced such effects on the product that they spoil its desirable properties as a semi-raw or fresh food, such as, for instance, excessive loss of its humidity and consequent dryness, which naturally spoils the taste and smell, change of colour, hardness, or excessive soltness.

There is no doubt that the aforesaid disadvantages are caused principally by the preserving agents used and, secondly, by the particular complementary conditions to which the meat is submitted, all of which jointly decrease the value from a commercial point of view and even as an element of nourishment.

The solution which is specifically described totally eliminates—in the preservation of meat—these deficiencies, and allows of the product being attractively presented to the consumer, attraction confirmed by its taste on being cooked by any of the methods to which raw meat is subjected.

The solution is hyperisotonic and also acts as a bactericide.

The solution comprises nitrate of sodium, chloride of sodium, glacial acetic acid, onion, garlic and water, and is made in the following manner: The chloride of sodium and nitrate of sodium are put into the water and boiled for half an hour, the result being a sterile solution. When cold, the acetic acid, onion and garlic are added—the two latter having been previously conveniently cut—thus producing a transmission of the active principles of the onion and garlic to the solution by way of the difference of concentration.

The solution should have a *p*H concentration between 5·50 and 6.

To obtain this under favourable conditions it has been possible to set down the partial quantities of components which may be varied to some degree if the process is to be accelerated, and I herein wish to point out that in the method of utilisation which I suggest—merely to illustrate the facts—the following have proved very beneficial for the preservation and conditions of the meat within the following variation:

Chloride of sodium	2,500-3,500 gms.
Nitrate of sodium ..	0·15-2·80 gms.
Glacial acetic acid ..	3-9 c.c.
Onion	600-900 gms.
Garlic	60-90 gms.
Water	35 litres

The most convenient method of use of the solution is the application thereof to the meat by immersing the latter in a bath for a period of 24 hours' duration at normal temperature, after which it is preferable to pack it in a container and, if possible, submit it to heat after the container has been hermetically closed up.

The product thus packed and ready for consumption is made up essentially of meat in its semi-raw state, since the treatment has in no way eliminated any part or proportion of its valuable properties, looked at from a nourishment point of view, neither are any of its other conditions, such as colour and taste, affected in any way, but are, on the contrary, exactly those of fresh meat.

542,831. Joaquin Sanchez Ubeda.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

544,935. LAING, J.: Fruit preserving. (Divided out of 10026/41.)

544,993. FORGROVE MACHINERY CO., LTD., RUSSELL, A., HARRIS, R. A., and PARKER, M.: Wrapping machines.

545,002. FORGROVE MACHINERY CO., LTD., and PARKER, M.: Wrapping machines.

545,180. BJERLING, O. B.: Closures for containers of foodstuffs and other substances.

545,234. WINGFOOT CORPORATION: Wrapper for foodstuffs.

545,497. REIST, H., and SURBECK, E. (trading as REIST AND SURBECK MASCHINENFABRIK): Machine for washing and peeling potatoes, turnips and other produce.

545,542. KANTOROWICZ, E.: Procedure to improve the taste of decaffeinated coffee.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

RICCORRO.—617,961. Coffee. **British Doughnut Co., Ltd.,** 126/7, Dorset House, Gloucester Place, London, N.W. 1; Manufacturers.

PINJAR.—618,017. Preparations of parsley, lemon and thyme, or of sage and onions, all for use as stuffing; meat extracts, edible oils and fats. **T. Lucas and Co., Ltd.,** Ruskit Mills, Moravian Road, Kingswood, Bristol; Manufacturers. To be Associated with No. 618,016 (3342) xxix and others.

SOYAVITA.—618,108. Soya flour and confectionery made of soya flour. **William Wilson Brown,** 27, Ratcliffe Terrace, Edinburgh; Manufacturer and Merchant.

PROTAVITA.—618,110. Eggs and dairy produce (for food). **William Wilson Brown,** 27, Ratcliffe Terrace, Edinburgh; Manufacturer and Merchant.

New Companies

Henry Dixon (Confectioners) Limited. (371750.) Britannia Works, Love Street, Sheffield. To take over the bus. of a manufacturing confectioner cd. on at Sheffield by H. Dixon. £8,000. Dirs.: H. Dixon, 59, Wilkinson Street, Sheffield; Elizabeth Dixon, 59, Wilkinson Street, Sheffield; H. Dixon, jnr., 6, Mylnhurst Road, Sheffield; Emily Walkland, 43, Wensley Drive, Chapel Allerton, Leeds.

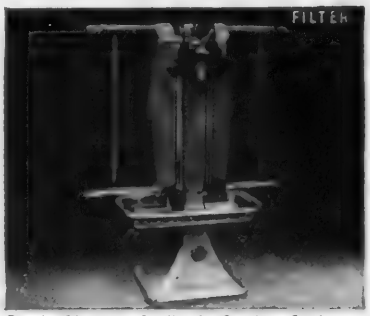
Mersey Rice Company, Limited. (371756.) 7B of "O" Building, The Temple, Dale Street, Liverpool. £10,000. Dirs.: J. R. Heap, Rowton Hall, Rowton, nr. Chester; H. H. Roberts, "Ethandune", Ormskirk, Lancs.

Tolman and Son, Limited. (371763.) 4, East Reach, Taunton. To take over the bus. of bakers, confectioners, corn and meal mchts. and hauliers cd. on at Taunton. £1,000. Dirs.: W. J. Tolman, 4, East Reach, Taunton, Som.; Mabel A. Tolman, 4, East Reach, Taunton, Som.; L. J. Tolman, 88, Hamilton Road, Taunton.

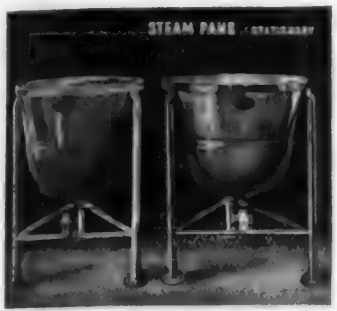
Atkinson (Fish Merchants), Limited. (371819.) £1,000. Dirs.: F. H. Atkinson, 8, Shaftesbury Avenue, Grimsby; A. Shiplee, 44, Robson Road, Cleethorpes, Lincs; C. J. Newton, 6, Huddlestone Road, Grimsby.

Speeds up output. Cools continuously and rapidly. Leaflet 200.

For sieving and separating pips, stones, and skins from fruits and vegetables. **Leaflet 177.**



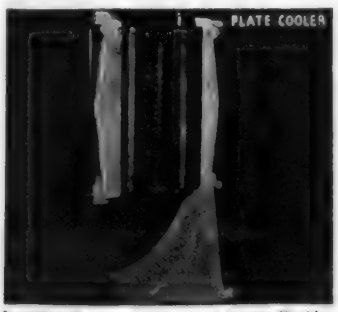
For the filtration of milk, clarification of gelatines and similar purposes. **Leaflet 184.**



For boiling jams, meats, soups, sauces, etc., in aluminium, stainless steel, nickel and monel, for various steam pressures. Smooth welded interiors. **Leaflet 213**

For boiling jams, meats, soups, sauces, etc. In aluminium, stainless steel, nickel and monel, for various steam pressures. Smooth welded interiors. **Leaflet 213.**

Legs and framework of cast aluminium. Top of steel plate covered with stainless steel or nickel. Extremely handsome and robust. **Leaflet 151.**



For cooling milk, sauces and various potable liquids. No moving parts. All surfaces in contact with liquids can be quickly exposed for cleaning. **Leaflet 185.**

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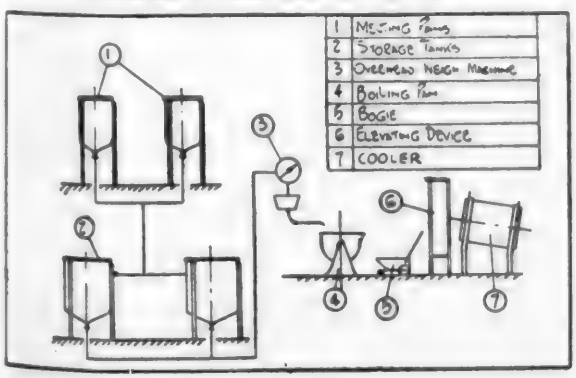

● Examples of standard A.P.V. Food Plant are shown on this page. In addition A.P.V. construct all-welded plant in Aluminium, Stainless Steel, Monel and Nickel to special designs produced in collaboration with clients. Factory layout schemes for efficient and economic production prepared by experts.

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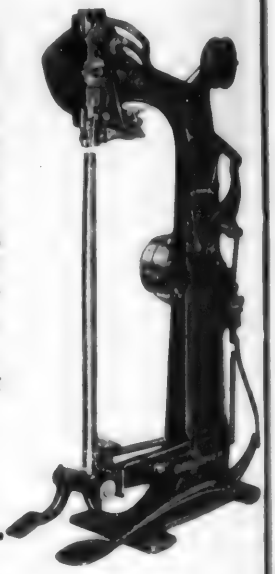

This machine serves for wire stitching the bottoms of single piece corrugated or solid board containers. The pillar type Anvil has 30-in. maximum reach and suffices for firmly fastening the bottom flaps with wire stitches automatically formed, driven and clinched from a reel of Ribbon Stitching Wire 12 by 25 or 12 by 26 gauge. An interchangeable top stitching tongue with adjustable work-table can also be supplied for wire stitching, also the tops of the filled containers in place of taping. Supplied in three styles, viz.: For Treadle use, Line-shaft drive, or self-contained direct motor drive. Speed to 150 stitches per minute.

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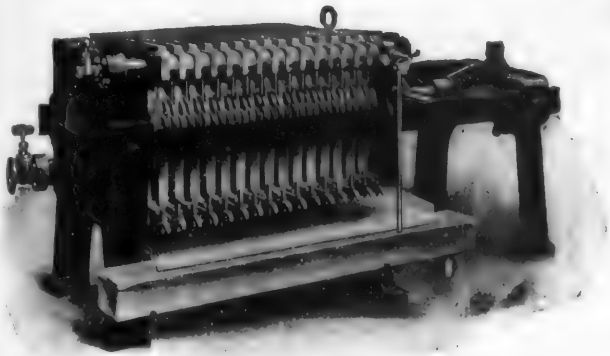

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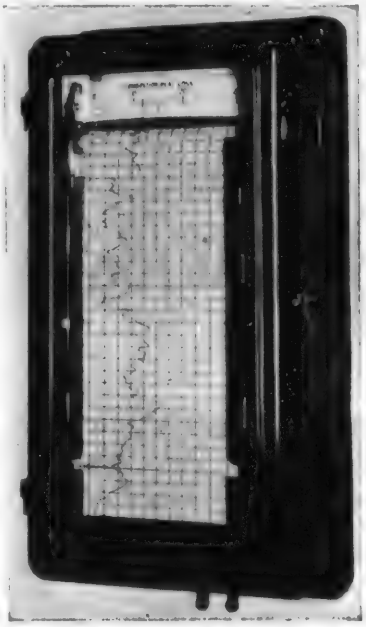

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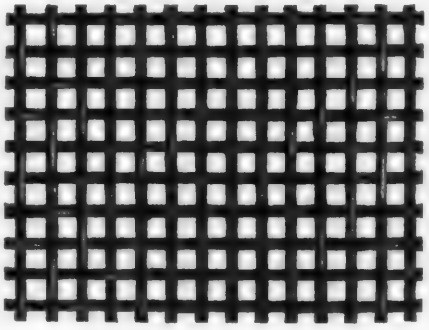

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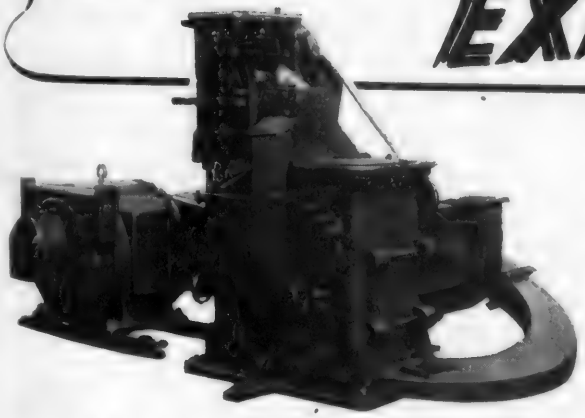

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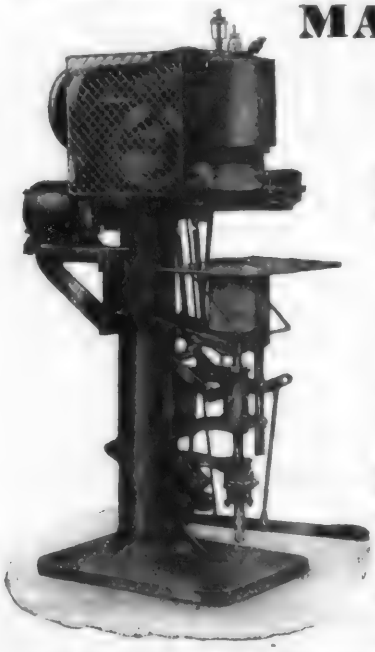

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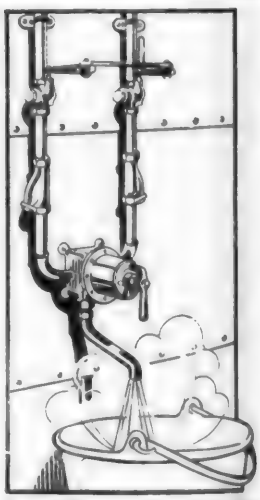

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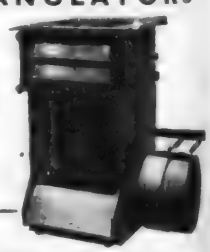

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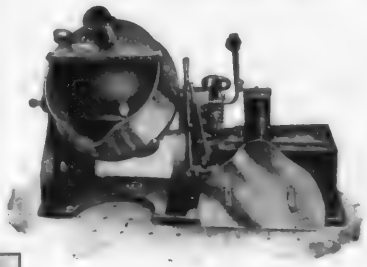

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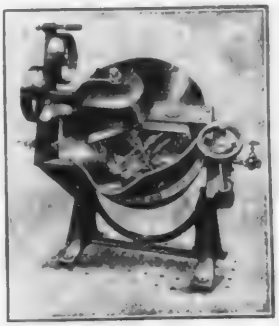

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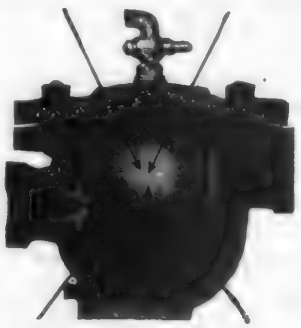

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PATENT No. 502,609 "Improvements in the manufacture of milk soluble alginate compounds." The owners of the above patent are desirous of arranging by licence or otherwise on reasonable terms for the manufacture and commercial development of the invention. For particulars address in the first instance to Herbert Haddan and Co., 31 and 32, Bedford Street, Strand, London, W.C.2.

THE proprietors of British Patent No. 493,103, dated March 30, 1937, relating to "Improvements in process of producing aerated expanded food products," are desirous of entering into arrangements by way of a licence or otherwise on reasonable terms for the purpose of exploiting the above patent and ensuring its practical working in Great Britain. Enquiries to Singer, Ehlert, Stern and Carlberg, Chrysler Bldg., New York City, N.Y., U.S.A.

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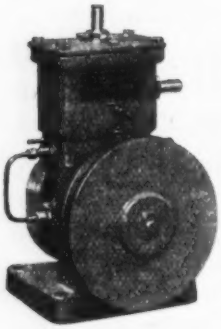

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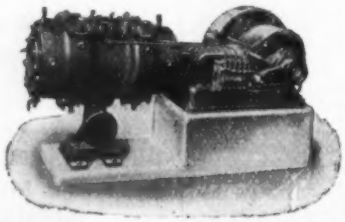

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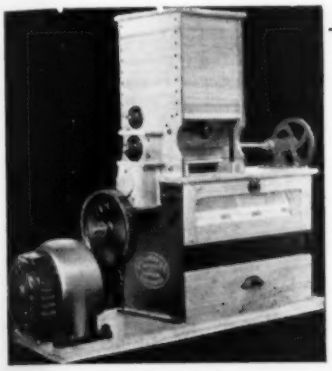

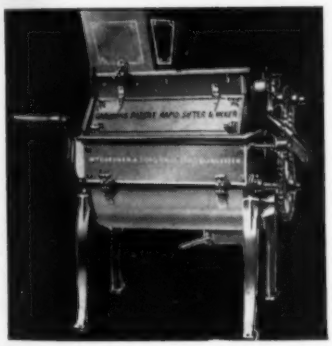

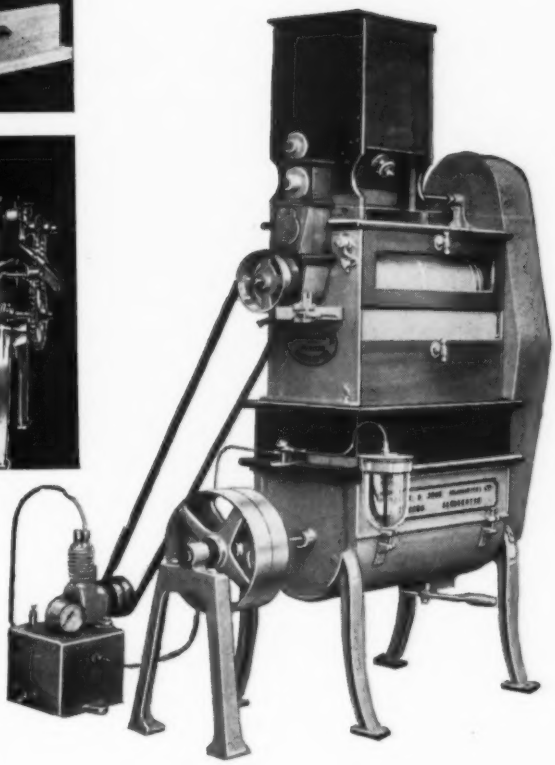

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